[Part 2. Reprinted 1958]

IMPERIAL MYCOLOGICAL INSTITUTE

REVIEW

OF

APPLIED MYCOLOGY

VOL. XI FEBRUARY 1932

LOHWAG (H.). **Zur Rinnigkeit der Buchenstämme.** [On the 'furrowing' of Beech trunks.]—*Zeitschr. für Pflanzenkrankh. u. Pflanzenschutz*, xli, 8, pp. 371–385, 5 figs., 1931.

A full account is given of the phenomenon described as 'furrowing' of beech trees observed by the writer in the neighbourhood of Vienna. As a result of infection by *Fomes fomentarius* [*R.A.M.*, x, p. 350], longitudinal grooves develop in the heartwood, along which decay proceeds rapidly. When the groove, together with the mycelium, reaches the cambium, the latter is killed and its activity ceases; in the adjacent regions, however, cambial activity is increased, so that the grooves are mostly lined by healing overgrowth. The manifestation is attributed to the absence in the sap- and heartwood of a current of water, a condition favouring luxuriant mycelial growth.

TUBEUF [C. v.]. **Ist Pinus peuce gegen den Blasenrostpilz immun oder für ihn nur wenig disponiert?** [Is *Pinus peuce* immune from the blister rust fungus or only slightly susceptible to it?]—*Zeitschr. für Pflanzenkrankh. u. Pflanzenschutz*, xli, 8, pp. 369–370, 1931.

Pinus peuce, formerly believed to be immune from attack by white pine blister rust (*Cronartium ribicola*) [*R.A.M.*, ix, p. 691], has now been shown by observations in Upper Bavaria to be slightly susceptible, though very much less so than *P. strobus* and *P. monticola*.

SREENIVASAYA (M.) & RANGASWAMI (S.). **Contributions to the study of spike-disease of Sandal (Santalum album, Linn.).**—*Journ. Indian Inst. Sci.*, xiv A, 5, pp. 59–65, 1931.

An ecological survey of some typical sandal (*Santalum album*) areas in Mysore, Coorg, and Madras was undertaken to determine the extent to which various hosts of this parasitic tree affect, especially its resistance or susceptibility to spike disease [*R.A.M.*, x, p. 697].

The results of the survey [which are tabulated and discussed] reveal some striking and suggestive differences between healthy and diseased areas. The latter are characterized by a complete absence or reduced incidence of certain species of plants, e.g., *Bar-*

leria buxifolia, Breynia rhamnoides, and *Pittosporum floribundum,* while conversely, the preponderance of certain species, such as *Atylosia albicans* and *Dodonea viscosa,* in healthy areas lends significant support to the theory that resistance to spike in sandal is governed by particular types of host. The high percentage of coppiced and dead stumps of host plants found in diseased areas confirms laboratory observations that infected sandal succumbs to spike more rapidly in the absence of a host. A marked connexion was further traced between the presence of spike and the preponderance or almost exclusive occurrence in association with the sandal of *Acacia pennata, A. sundra, Atalantia monophylla, Clausena wildenowii, Lantana camara* (4,747 plants in spiked compared with 284 in healthy areas), *Limonia acidissima, Phyllanthus polyphyllus, Pterolobium indicum, Strobilanthes kunthianus,* and *Triumfetta rhomboidea.*

Agricultural operations have been found to be constantly associated with the primary site of the first attack of spike, the felling of the host plants apparently rendering sandal susceptible to infection. The origin of the infective principal, however, still remains obscure.

BROWN (A. B.). **Observations on leaf fall in the Douglas Fir when infected with Rhabdocline pseudotsugae Sydow.**—*Ann. of Appl. Biol.,* xvii, 4, pp. 745–754, 1 pl., 1930.

After a brief account of the needle cast disease of Douglas firs (*Pseudotsuga glauca* and *P. douglasii* var. *caesia*) [*P. taxifolia*] caused by *Rhabdocline pseudotsugae,* which is stated to be based on the investigations of M. Wilson and Miss Wilson [*R.A.M.,* v, p. 637], the writer gives full details of his anatomical study of the abscission mechanism in this tree.

It was found that the abscission layers and associated tissues are laid down very early in the normal development of the leaf. In nature the leaves do not fall in strict progression in respect of age, indicating that defoliation is not due to the completion of an abscission mechanism from the histological standpoint. This is confirmed by the fact that, in the diseased tree, the infected leaves fall at an age of just over one year, with no abnormality of the abscission layers. The complete defoliation of infected leaves is evidently due to the abscission mechanism becoming effective under certain physiological conditions, foremost among which appears to be the marked decrease in the water content of the foliage caused by the fungus.

LIESE (J.). **'Zum Kiefernsterben in Nordwestdeutschland.'** [On the dying-off of Pines in north-west Germany.]—*Forstarch., 1931,* 17, pp. 333–334, 1931.

Dying-off of pines in north-west Germany has recently been attributed by M. Trènel of Berlin to a species of *Oedocephalum* characterized by simple conidiophores with capitate apices from which conidia radiate on all sides. A similar formation, however, is typical of the imperfect stage of *Polyporus* [*Fomes*] *annosus* (*Heterobasidium*), to which the writer is inclined to ascribe the pine disease [*R.A.M.,* v, p. 714; vii, p. 552; x, p. 699].

VANINE (S. I.). Домовые грибы, их биология, диагностика, и меры борьбы. [House fungi, their taxonomy, diagnosis, and control.]—112 pp., 45 figs., Гос. тип. изд. „Ленинградская Правда" [State Publishing Offices 'Leningradskaya Pravda'], Leningrad, 1931.

This little monograph gives a summary of the information contained up to date in the Russian and foreign literature dealing with wood-destroying fungi in dwellings, with more particular reference to those that are known to occur in Russia. Brief descriptions are given of 44 species, which are divided into four groups: Polyporaceae, Thelephoraceae, Agaricaceae, and Hydnaceae. Considerable space is devoted to the biology of the fungi, and to the methods for their identification both macroscopically and in pure culture, the characteristics of the various organisms being shown in three separate keys. Control measures are also dealt with at length. Most of the figures illustrating this book are original.

VANINE (S. I.). Меры борьбы с домовыми грибами. [Measures for the control of house fungi.]—*Plant Protection*, Leningrad, viii, 1, pp. 25–34, 1931.

In this paper the author gives some practical recommendations for the prevention of the infection of constructional timber with wood-rotting fungi, among which *Merulius lacrymans*, *Poria vaporaria*, and *Coniophora cerebella* are stated to be the most common and most dangerous in dwellings in Russia, and goes on to describe the measures for their control and elimination from infected buildings. A special section deals with the preparation and application of the more usual timber preservatives and fungicides, e.g., sodium fluoride, mercuric chloride, carbolineum, formaldehyde, sulphur dioxide, and the like.

WILLRICH (O.). **Ein Beitrag zur Bekämpfung von Holzschädlingen.** [A contribution to the control of timber pests.]—*Der Bautenschutz*, ii, 8, pp. 89–92, 1931.

Recently the Danish Technological Institute has devised a new method for the treatment by hot air of timber in buildings attacked by *Merulius lacrymans*, which may be carried out with the 'Deuba' apparatus (Deutsche Bauten-Trocknungs-Gesellschaft, Hanover). These machines, which heat the atmosphere to 250° C., consume about 1 cwt. mine coke and 4 to 5 kilowatts of electric current per hour. *M. lacrymans* cannot withstand a temperature above 40° [*R.A.M.*, x, p. 572], so that this method is very effective in its control.

RABANUS (A.). **Die toximetrische Prüfung von Holzkonservierungsmitteln.** [The toximetric testing of wood preservatives.]—*Angew. Bot.*, xiii, 4, pp. 352–371, 4 figs., 8 graphs, 1931.

A full account is given of the writer's laboratory experiments on the action of various timber preservatives (copper sulphate, zinc chloride, corrosive sublimate, sodium fluoride, sodium bichromate, and arsenic acid) on a number of wood-destroying fungi,

including *Fomes annosus*, *Merulius domesticus* [*M. lacrymans*], *Coniophora cerebella*, *Polystictus versicolor*, *Polyporus schweinitzii*, *P. vaporarius* [*Poria vaporaria*], *Lenzites abietina*, *L. sepiaria*, *L. trabea*, *Schizophyllum* [*commune*], *Stereum purpureum*, *Trametes pini*, and *Lentinus lepideus* [*R.A.M.*, x, p. 572].

It was evident from these tests that the action of a preservative on a fungus in the wood itself cannot be deduced from the reaction to the fungicide of the same organism on malt extract agar. It was further ascertained that the fungi under investigation vary widely in their reaction to the different preparations used, *C. cerebella*, for instance, being extremely sensitive to arsenic acid and very resistant to copper sulphate, while *Schizophyllum commune* is highly sensitive to both. It is not sufficient, moreover, to determine the inhibition limits of only one fungus by the wood block method and of the rest on agar, calculating the wood block values for the latter on the basis of the relation between agar and wood block values for the one organism tested by both methods, since there is no common factor to reduce all to the same level.

It has often been found in practice that the inhibition values obtained by the agar method are too favourable to the preservative, and that only those derived from the wood block method afford any clue to the action of the fungicide under natural conditions. On the other hand, practical experience has shown that the unfavourable results frequently given by the wood block method may not do justice to the fungicidal properties of certain substances, e.g., dinitrophenol. Further studies are in progress to elucidate these differences.

MÖRSDORF. **Schutz des Bauholzes gegen Fäulnis.** [Protection of structural timber against decay.]—*Der Bautenschutz*, ii, 3, pp. 29–34, 6 figs., 1931.

Directions are given in popular terms for the impregnation of structural timber in Germany against the wood-destroying fungi *Merulius lacrymans* and *Polyporus vaporarius* [*Poria vaporaria*], the biology of which is briefly described. For external application fluralsil (Brander Farbwerke Brand-Erbisdorf, Saxony) is stated to have proved very effective, applied first at a strength of 20 per cent., then, after drying, at 50 per cent., and finally undiluted. Rooms that have been invaded by the above-mentioned organisms should be treated with hot Avenarius carbolineum (1 kg. per 4 to 6 sq. m.) which penetrates deeply into the wood and kills the fungi without injuring the timber. Antinonnin (2 to 3 per cent.), supplied by the I. G. Farbenindustrie [*R.A.M.*, viii, p. 3], is an entirely odourless and very effective preparation which does not stain the wood. Mikrosol (Rosenzweig u. Baumann, Cassel) [ibid., iii, p. 492 ; iv, p. 250], a brown, water-soluble preparation almost devoid of odour, has also given excellent results.

WOLMAN [E. H.] & PFLUG. **Über Holzkonservierung mit wasserlöslichen Salzen.** [On timber preservation with water-soluble salts.]—*Zeitschr. für Angew. Chemie*, xliv, 34, pp. 696–698, 1931.

After a brief discussion of Curtin's zinc meta-arsenite process

of timber preservation [*R.A.M.*, ix, p. 80], the writers give an account of their tests with *Coniophora cerebella* and *Polyporus vaporarius* [*Poria vaporaria*] on pine sapwood blocks treated with 1 or 2 per cent. thanalith U, a proprietary compound containing dinitrophenol, fluoride, arsenic, and chrome salts, by the Berlin conference methods [ibid., x, p. 357]. The loss from leaching out in wood treated with the 2 per cent. solution was estimated at 36 per cent., but it is possible to reduce this loss to 20 per cent. for purposes in which resistance to lixiviation is of primary importance, e.g., under-water structures. The toxic minimum of the 1 per cent. solution for *C. cerebella* was 0·30 to 0·36 kg. per cu. m. of sapwood, compared with 0·22 to 0·29 kg. per cu. m. for *P. vaporaria*. Solutions of thanalith U ranging from 1 to 6 per cent. did not corrode Siemens-Martin ingot-iron either at room temperature or at 80° C., and their use is further stated to present no technical difficulty.

[An English version of this paper is published in *Chem. Age*, xxv, 635, p. 189, 1931.]

Moll (F.). **Holzschutz im Bauwesen.** [Timber protection in building.]—*Der Bautenschutz*, ii, 6, pp. 65–68, 1931.

Popular notes are given on the two main classes of timber preservatives in common use against fungous and insect pests in Germany, viz., coal-tar and its derivatives and metallic salts, of which corrosive sublimate, zinc chloride, and sodium fluoride are the most effective [*R.A.M.*, x, p. 572]. Of recent years an energetic campaign has been launched in favour of the dinitrophenol-containing Wolman salts (triolith, thanalith, &c.) [see preceding abstract], but these are not equal, in the writer's opinion, to the older-established methods.

Linford (M. B.). **Transpirational history as key to the nature of wilting in the Fusarium wilt of Peas.**—*Phytopath.*, xxi, 8, pp. 791–796, 2 graphs, 1931.

A uniformly susceptible pure line of the Alcross pea variety was grown in unsterilized, uninoculated soil and also in sterilized soil inoculated a year previously with a pure culture of *Fusarium orthoceras* var. *pisi*, both soils containing 60 per cent. of the water-holding capacity, retained by sealing with wax. The average total area of the uninoculated plants after 12 days was 96·4 sq. cm., and that of the diseased plants, all of which showed symptoms of wilt by the ninth day, 75·4 sq. cm. A study of the daily transpirational ratios of individual plants indicated that most of them underwent a rapid loss of water during wilting, and that reduced availability of water is not the primary factor, and possibly not a very important one, in the final wilting characterizing the severe early development of the disease. More significant is some fundamental alteration in the protoplasts of the leaf cells, probably their actual death, which involves the loss of their normal capacity for water retention with consequent loss of turgor and wilting of the leaves.

LINFORD (M. B.). **Studies of pathogenesis and resistance in Pea wilt caused by Fusarium orthoceras var. pisi.**—*Phytopath.*, xxi, 8, pp. 797–826, 8 figs., 1 graph, 1931.

The results of experiments carried out at Madison, Wisconsin, showed that the pea wilt fungus (*Fusarium orthoceras* var. *pisi*) [see preceding abstract] can infect the plant and produce the disease without the aid of other micro-organisms or of mechanical injury. The symptoms are readily developed by peas grown in cotton-plugged culture tubes of sterilized soil or of an agar substratum, inoculated with a pure culture of the pathogen. Wounding the root system was found slightly to delay the appearance of symptoms in plants of a susceptible variety (Badger) and did not impair the resistance of Horal.

In the typical development of pea wilt under conditions favourable for the disease, very distinctive changes precede wilting in the affected plants. These include pronounced dwarfing, increased rigidity of the entire shoot, hypertrophy of the lower stem internodes, and rolling of leaf laminae. Before wilting begins, diseased pea stems lose water more slowly on exposure to drying and have a higher content of dry matter with a proportionately increased ash content, a heightened osmotic value of the cell sap, and an augmented capacity for regeneration.

Filtrates from cultures of the wilt fungus on Richards's solution produce a type of rapid necrosis in cut pea stems which appears comparable to the sudden wilting of young plants in the early stages of the disease. Experiments with ten strains and varieties of peas failed to reveal any correspondence between resistance or susceptibility to the toxic culture filtrates and the same characters in relation to *Fusarium* wilt.

Water shortage directly or indirectly induced by the fungus may sometimes be a factor in the wilting of large plants, but probably not in the early collapse of young seedlings. Pathogenesis must be mainly attributed to the action of toxic substances resulting from the presence of the fungus within the host.

LINFORD (M. B.). **Wound inoculation in relation to resistance in the Fusarium wilt of Peas.**—*Phytopath.*, xxi, 8, pp. 827–833, 2 figs., 1931.

The symptoms manifested by pea plants inoculated in the above-ground parts with *Fusarium orthoceras* var. *pisi* [see preceding abstracts] differed somewhat from those typical of the wilt disease caused by this fungus. A few days after inoculation the growth of the terminal bud was retarded, the stems and petioles became swollen and rigid, and the leaflets and stipules rolled backwards or became distorted, thick, firm, and abnormally dark green, followed by the collapse of the stipules, leaflets, petioles, and stem tips. Some of the plants made partial recovery, resuming apical growth with the production of approximately normal leaves.

Even in the most severely damaged plants infection remained localized within the vascular bundles first penetrated by the fungus, the vertical extent of the invasion apparently being limited by the occlusion of vessels with brown, granular or gum-

like wound reaction products. In no case was the fungus observed to traverse more than two internodes from the point of inoculation. The local development of the fungus stimulated the surrounding parenchymatous cells to the formation of a cambium-like layer and a sheath of new tissue several cells in thickness encircling the xylem portion of the bundle. This occurred both in the central cylinder and around infected stipule traces in the cortex.

This limited extent of the infection makes it evident that the wilting and ultimate collapse of the affected organs result from the distribution of toxic products of the fungus throughout the plant. No marked differences in reaction to stem inoculations were observed in resistant as compared with susceptible pea varieties, indicating that varietal resistance is located in the root system.

Abramoff (I. N.). Грибные болезни Соевых бобов на Дальнем Востоке. [Fungal diseases of Soy-beans in the Far East.]—pp. 3–84, 41 figs., in Болезни и вредители Соевых бобов на Дальнем Востоке. [Diseases and pests of Soy-beans in the Far East.]—Pamphlet issued by *Дальстазра* [*Far-Eastern Plant Prot. Stat.*], Vladivostock, 120 pp., 55 figs., 1931.

In this paper the author gives an account of the following fungal diseases of the soy-bean which were recorded in the Russian Far East during a preliminary phytopathological investigation in 1928 and 1929. Downy mildew (*Peronospora manshurica*) [*R.A.M.*, x, p. 638] may either produce localized infection, in which case the damage is insignificant, or systemic, causing a noticeable stunting of all the aerial organs of the host with a consequent considerable reduction in yield; although the disease is widespread throughout the country, the second form only appears in some localities, chiefly on the so-called Gundzhuli variety (*Glycine hispida* var. *albo-flavida* f. *latericia* Tupik.). Observations on varietal reaction indicated that the greatest susceptibility is exhibited by the varieties with yellow or green beans, while those with black and brown beans were practically immune under the same conditions.

White stem rot caused by *Sclerotinia libertiana* [*S. sclerotiorum*] inflicts considerable losses in some districts, especially where there is much sunflower cultivation. All varieties are apparently equally susceptible to this fungus, one of the chief measures for the control of which, in addition to the usual sanitary precautions in the field, is the avoidance of sowing soy-beans in rotation with the highly susceptible sunflower.

Leaf spot caused by *Cercospora daizu* [the spelling *diazu* as used by some authors is not that given in Miura's original diagnosis: cf. ibid., vii, p. 760; ix, p. 289] was also observed. The fungus showed a wider range of measurements of the conidia than those given in the original diagnosis, namely 22 to 86 by 5 to 9 μ instead of 39 to 70 by 5 to 6 μ, but this may have been due to the greater number of spores measured, the average length (52·2 μ) being very close to that indicated by Miura (54·5 μ). This species appears to be closely related to *C. cruenta* [ibid., ix, p. 187], from which it differs only in having shorter and thicker spores produced

on only one side of the leaf. The spots caused by the fungus were occasionally found to bear perithecia of *Mycosphaerella phaseolicola* (Desm.) Sacc., which may be its perithecial stage.

Soy-bean seedlings are frequently killed by a serious blight caused by a strain of *Fusarium* with falcate, hyaline (pinkish in the mass), four- to five-septate conidia, 25 to 42 (majority 35 to 37) by 2 to 3 μ. In wet weather the lesions on the hypocotyl, cotyledons, and collar of the seedlings develop a downy, white aerial mycelium which later forms bright pink or orange crusts. Diseased seedlings may occasionally recover, but the resulting plants always remain stunted, and not infrequently from 30 to 60 per cent. of the stand is killed. The chief source of infection seems to be the seed, and it is recommended not to use seed from crops infected with this blight. Tracheomycosis or wilt caused by *F. tracheiphilum* [ibid., ix, p. 360] is chiefly prevalent in the Littoral province. In late summer soy-bean leaves frequently show a severe spotting, with subsequent dropping-out of the diseased tissues, which is caused by a strain of *Fusarium* closely resembling *F. tracheiphilum*. In the district of Vladivostock a serious stem break of young plants, which killed from 9 to 42 per cent. of the crop, was observed in 1929. It was caused by an unidentified fungus believed to be a *Fusarium*, with hyaline, frequently septate hyphae, 5 to 8 μ in diameter, which, when the diseased plants were placed in a moist chamber, in two days formed an abundant downy, white efflorescence, but produced no spores. When approaching maturity the soy-beans still in the pods (chiefly those attacked by the larvae of a species of *Eucosma*) are frequently covered with a pink efflorescence, consisting of conidia of a *Fusarium* differing from those mentioned above; the spores are hyaline, slightly bent (more so at the distal end), usually one-, but occasionally two- or three-septate, and measure 38 to 45 by 3 to 4·5 μ. The cotyledons of the diseased beans also bear numerous perithecia of a species of *Gibberella* which may be the ascigerous stage of this *Fusarium*.

A very widespread disease, particularly on the Amur and in the Littoral province, is caused by a species of *Ascochyta* which differs from *A. phaseolorum* and *A. pisi* in its morphological characters and symptoms [the differences being shown in a comparative table]; it is considered to be new to science and is named *A. sojaecola*, a Latin diagnosis being appended. The fungus attacks the leaves, stems, and pods [the symptoms on which are fully described], on which it forms numerous slightly sunken, spheroidal, dark pycnidia, 30 to 220 μ in diameter, containing hyaline, cylindrical or slightly ellipsoidal, two-celled spores, slightly constricted in the middle, and 8 to 11 by 3 to 5 μ. The disease is most severe in dense stands sown for fodder, and on varieties with black or brown beans, while those with green beans are apparently immune. Among the varieties with yellow beans, those with purple flowers were rather severely attacked, and those with white flowers were comparatively resistant.

The other diseases recorded include a leaf spot caused by *Septoria glycines* [ibid., ix, p. 228]; an olive-coloured leaf spot due to *Phyllosticta sojaecola* in association with its ascigerous stage

Pleosphaerulina sojaecola [ibid., vi, p. 74; ix, p. 227]; angular, brown spots caused by *Isariopsis griseola* [ibid., ix, p. 626]; and a grey mouldiness of the leaves due to *Hypochnus centrifugus* [*Corticium centrifugum*: ibid., vi, p. 74]. Brief descriptions are also given of a number of saprophytic fungi found on the soy-bean plants (among which *Alternaria tenuis* [ibid., xi, p. 77] is stated occasionally to attack leaves weakened by other causes, and thus to hasten their destruction), as well as of fungal diseases which are known to affect this host elsewhere but have not yet been recorded in the areas investigated.

Мозаичные болезни Сахарной Свеклы. [Mosaic diseases of the Sugar beet.]—286 pp., 22 pl., 12 figs., 17 graphs, Plant Breeding Dept. of Union Sugar Industry, Kieff, 1930. [English summary. Received July, 1931.]

This book consists of a collection of articles [with English summaries] on the results obtained in the study of the virus diseases of the sugar beet in the Ukraine. Two of these (by P. A. Proyda and I. S. Shevtchenko, respectively) give detailed accounts of the work done from 1925 to 1927 and in 1928–1929 at the Kharkoff District Agricultural Experiment Station; one (by A. I. Novinenko) deals with the insect vectors of the diseases; and two (by V. I. Shevtchenko and L. M. Shevtchenko, respectively) give data on the economic importance of sugar beet mosaic, and the influence exerted on its development by different dates of sowing. In a brief paper A. M. Levshin claims to have confirmed the presence in mosaic tissue of the sugar beet of the intracellular bodies ('elytrosoma') described by Schaffnit and Weber [*R.A.M.*, vii, p. 108]. V. P. Mouravieff [under whose general direction the whole investigation was conducted] contributes three papers, one of which is a review of the relevant Russian and foreign literature up to date, the second gives a very full description of the various forms of mosaic patterns observed on the foliage of the sugar beet, and the third is a detailed summary [with an English version extending to some 40 pages] of all the results obtained in the work, a brief outline of which is also given in a concise statement by T. D. Strakhoff at the beginning of the volume [the only paper without an English summary].

As taken from these two summaries, the investigation indicated that although the virus diseases of the sugar beet were first officially recorded in the Ukraine in 1925, they are probably of much longer standing; at the present time their presence has been definitely established over practically all the beet-growing areas of the Ukraine, the central Russian black soil belt, the north Caucasus, and in several other localities. In dealing with the different forms of the diseases encountered, it is stated that curly top has not yet been found, and that although the considerable variations in the mosaic patterns seen on the foliage would indicate that there is more than one type of mosaic, the results so far have failed to give conclusive evidence as to whether each is due to a single entity or to the combination of two or more viruses. In the neighbourhood of Vinnitza (Podolia) a form was observed on sugar beets growing at a distance of half a kilometre from

tobacco plants affected with ring spot, which was very reminiscent of this disease, and which is believed to have been transferred from the tobacco to the beet; besides the characteristic pattern of the spots, the disease on the latter host is distinguished from the usual mosaic by the ease with which it is transmitted by the juice from diseased plants. The economic importance of this disease of the sugar beet has not yet been established.

Confirmation was obtained that sugar beet mosaic is not transmitted by the seed or through the soil [cf. ibid., x, p. 574]. The chief source of primary infection of beet seedlings in the spring is the second year seed plants, a high percentage (ranging from 15 to 100) of which are usually infected. It was shown that the incidence of infection among the seedlings rapidly decreased as their distance from the mother beets increased, the lowest safe limit being 770 m. Another important source of infection is believed to be weeds, numerous species of which are known to harbour virus diseases; among these *Chenopodium album*, *Amaranthus retroflexus*, and *Sonchus arvensis* were experimentally infected by *Aphis fabae* [*A. rumicis*] with the beet mosaic, the disease having been also successfully transmitted from the two last-named species to beet. There was some evidence that infection may also be carried by cultural implements, e.g., knives used for topping indiscriminately diseased and healthy plants, but this needs further confirmation. In storage, infection was shown to occur through direct contact between mosaic and healthy roots. The fact that infection of the seedlings in the spring usually occurs before the appearance in the fields of the aphid vector is considered to indicate that other insects are implicated in the dissemination of the disease, the most active of these carriers probably being *Lygus pratensis*, *Poeciloscytus cognatus*, and *Chlorita flavescens*.

No differences were observed in the relative resistance to mosaic of the very numerous strains of sugar beet which were tested, but some strains appeared to be more tolerant of the disease than others, as shown by the weight and sugar content of the roots, while in a few strains the disease even appeared to increase the weight of the roots and their sugar content. Mouravieff suggests an explanation of this apparent paradox by the hypothesis that in the field it is usually the more vigorous plants with luxuriant foliage that attract most of the insect vectors; such plants, although infected at an earlier date and presumably carrying more virus than weaker ones, very likely preserve their greater vigour up to the end of the vegetation, and finally show much less effect of the disease than the weaker ones, even though the latter are less severely infected. This hypothesis finds support, in his view, in the general experience that crops raised from ordinary commercial (sugar-factory-produced) seed, which consist of a very mixed population, usually show much less decrease in root weight and sugar content than crops raised from pure lines of seed produced by the plant breeding stations, the population of which is much more uniform. The actual effect of mosaic on yield both in root weight and sugar has not yet been finally established, and needs further investigation in view of the contradictory results so

far obtained. The yield in seed is, however, definitely adversely affected by the disease.

Owing to its endemic and widespread character the disease is very difficult to bring under control, but much might be done by a careful selection of undoubtedly healthy plants for seed production, the removal of seed-plant plots as far as feasible from the sugar beet fields [ibid., x, p. 575], and measures directed towards the suppression of weeds and insect carriers.

SOLUNSKAYA (Mme N.). Урединоз Сахарной Свеклы. [Sugar Beet rust.]—*Наукові Записки з Цукрової Промисловости.* [*Sugar Industry Scient. Notes*], Kieff, xiii, 2, pp. 609–611, 4 figs., 1931.

In this brief note the author states that sugar beet rust (*Uromyces betae*), which hitherto was of little consequence in the Ukraine, is now steadily gaining ground, new foci being discovered almost every year. This raises the question of the possibility that infection is introduced into new areas by the seed, some samples of which, especially of German origin, have been proved to carry the spores. In one locality the uredosori of the rust were found to be heavily parasitized by *Darluca filum* [*R.A.M.*, v, p. 314], but the control of the rust by means of this fungus is not thought to be appreciable since it usually appears towards the end of the development of the disease.

STIRRUP (H. H.) & EWAN (J. W.). **Investigations on Celery diseases and their control.**—*Min. of Agric. & Fish. Bull.* 25, 34 pp., 5 pl., 3 figs., 1931.

The chief seedling disease of celery in the Isle of Axholme, north Lincolnshire, is a root rot, probably due to *Pythium artotrogus* [*R.A.M.*, vi, p. 360], which starts at the root tips and works backwards. In mild attacks the patches of seedlings present a slightly withered appearance, with drooping cotyledons, and are readily pulled out, the root tips and sometimes the whole of the secondary rootlets being shrivelled, rotting, and reddish-brown. In severe cases many seedlings collapse and lie on the surface of the soil about the time when they are breaking into the first 'rough' leaf. Others remain erect but turn purplish-red, with drooping cotyledons. The roots of such plants and part of the hypocotyl are destroyed, leaving only shrivelled, reddish-brown remnants. The diseased roots were constantly found to contain smooth-walled oospores contained in bluntly spiny oogonia resembling those of *P. artotrogus*. The ordinary and resting sporangia of a Chytridiaceous fungus, probably an *Olpidium*, were also found in association with the *Pythium*. Good control of this disease may be obtained by soil disinfection with formalin at the rate of 2 to 4 pints per sq. ft.

Both seedlings and adult plants are attacked by *Phoma apiicola* [ibid., ix, p. 357], which infects the region just below the collar. This disease is to some extent seed-borne and partially controllable by seed treatment with formalin or mercuric chloride.

The two distinct types of leaf spot (*Septoria apii*) symptoms are described [ibid., x, p. 430]. The standard seed treatments for the control of this disease are only partially successful, viable

pycnospores being obtainable from the pycnidia of the fungus on infected seed after immersion in dilute formalin. The best results have been given by soaking the seed for periods up to 24 hours in 40 per cent. formaldehyde at a dilution of 1 in 400. The results of five years' spraying and dusting experiments [which are described in detail] showed that home-made Bordeaux mixture gave the best control of leaf spot, the net increase due to spraying in 1926 being estimated at £45 8*s.* 9*d.* per 1,500 bundles (one acre). In 1927 sprayed celery (100 bundles) realized 30 shillings in the market compared with 10 for unsprayed. Commercial quantities of celery seed free from infection by *S. apii* have been obtained by the use of carefully selected seed and regular spraying of the plants during their two years' growth.

BREMER (H.). **Der Spargelrost.** [Asparagus rust.]—*Obst- und Gemüsebau*, lxxvii, 8, pp. 132–134, 3 figs., 1931.

A popular account is given of asparagus rust [*Puccinia asparagi*], which occurred in epidemic form in Germany during the summer and autumn of 1930 [*R.A.M.*, x, p. 816]. The full extent of the losses from this disease cannot be gauged until the following season; in the present case they are estimated at about M. 10,000,000. Some suggestions for the prevention of the disease are made.

KORDES (H.). **Eine durch Bakterien hervorgerufene Blattfleckenkrankheit der Gurken. Vorläufige Mitteilung.** [A leaf spot disease of Cucumbers caused by bacteria. Preliminary note.] —*Nachrichtenbl. Deutsch. Pflanzenschutzdienst*, xi, 8, pp. 63–64, 3 figs., 1931.

For some years cucumbers in the Frankenthal district of the Palatinate have been affected by a bacterial disease in which the older leaves are covered with sharply delimited, brown (occasionally greyish-white or yellowish) spots. The causal organism is believed to be *Pseudomonas* [*Bacterium*] *lacrymans* [*R.A.M.*, ix, p. 10]. In most seasons the disease only appears towards the middle or end of August, when the cucumber harvest is nearly over, but in 1931 infection was observed at the end of June and spread was extensive.

TROCHAIN (J.). **La 'lèpre' de l'Arachide au Sénégal.** ['Leprosy' of Groundnut in Senegal.]—*Rev. de Bot. Appliquée et d'Agric. Trop.*, xi, 117, pp. 330–334, 1931.

The author states that the disease of groundnuts known in the vicinity of Baol and Cayor, Senegal, as 'leprosy' ('gana') is in reality rosette. The affected plants have a tufted, witches' broom-like appearance, with variegated, crinkled, shrivelled leaves, and a generally yellowish appearance. The term 'leprosy' is used as denoting the symptoms on the branch tips, where the terminal leaves show patches of chlorosis and break away from the rachids.

Other plants growing near by showed almost complete sterility; they were much smaller than normal, e.g., 20 cm. instead of 50 to 60 cm. in diameter, and had vertical shoots with dwarfed, crinkled, excessively dark green or yellow leaves. The internodes were shortened, giving the plants a bunchy, lettuce-like appearance.

In the author's opinion, this condition corresponds to that known as 'clump' in India [*R.A.M.*, viii, p. 696] and is of physiological origin, resulting from mechanical injury, insect attack, or some unfavourable condition of growth. Either condition may become superimposed on the other, resulting in a lettuce-like plant with mosaic leaves.

In some experimental fields near Thiès all the plants were affected by rosette; in Bayol and Cayor the average amount of the disease was 10 to 15 per cent.

Under the conditions prevailing locally, control methods should consist in roguing, using only clean seed, prohibiting the import into unaffected areas of seed from areas where the disease is present, early sowing (rosette is commonest on varieties sown after the first rains), and the use of resistant varieties such as Basse, Philippine Pink, and Philippine White [cf. ibid., xi, p. 27].

Oltarjevski (N. P.). Ориентировочная кривая мильдью Винограда (**Plasmopara viticola**) в районе Дербента по данным одного вегетационного периода **1929** года. [The provisional curve of Vine mildew (*Plasmopara viticola*) in the region of Derbend, based on the data obtained in the single vegetative season of 1929.]—*Materials for Mycol. and Phytopath.*, Leningrad, viii, 2, pp. 155–160, 3 graphs, 1931.

In this paper the author gives details of his meteorological observations in 1929 in Derbend (Daghestan) during the vegetative period of the vine, in connexion with the varying length of the incubation period of mildew (*Plasmopara viticola*). On the ground of the data obtained he constructed a preliminary 'incubation curve' of the disease for the Derbend region. In pointing out the deviations of this curve from that established by Müller [*R.A.M.*, x, p. 432], he states that similar observations during a number of consecutive years may tend to smoothe out the differences. In any case, the investigation demonstrated, in his view, the entire feasibility of working out such curves for the different vine-growing regions of the world, in order to predict the likely date of mildew outbreaks in any given year, and under any given set of climatic conditions.

Salmon (E. S.) & Ware (W. M.). **Report from the Mycological Department.**—*Journ. South-Eastern Agric. Coll., Wye, Kent*, xxviii, pp. 48–56, 1931.

This report contains the following items of phytopathological interest, apart from those already noticed from other sources. *Roesleria hypogaea* was found on rose roots [*R.A.M.*, vi, p. 33]; a *Pythium* caused a root rot of young tomatoes about to be moved into the greenhouse in the second week of February; a root rot of young cucumbers was also due to a *Pythium*; and two instances were noted of the physiological blackening, usually evident only after boiling, of potato tubers, associated with deficient potassium in the soil and rough handling [ibid., ix, p. 741]. Apricot branches bearing shield-shaped cankers were infected by *Monilia* [*Sclerotinia*] *laxa*, considered by Wormald to be a synonym of *M.* [*S.*] *cinerea* [ibid., vi, p. 619]. Quince leaves and blossom spurs

attacked by *S. cydoniae* were received from Hampshire and *S. mespili* was noted on a medlar tree at Wye, Kent. Potato blight (*Phytophthora infestans*) appeared in the last-named locality on 10th July, and, favoured by the wet summer, soon destroyed any haulm which had been left unsprayed or which had been sprayed too late; the Incomer variety was the most resistant, while President was also highly resistant, and Arran Chief somewhat so.

Plaster-mould disease (*M. fimicola*) of mushroom spawn [ibid., vii, p. 488] was reported from two localities.

During the wet summer of 1930, no spraying was carried out in the hop nursery at Wye, and downy mildew (*Pseudoperonospora humuli*) was allowed to develop unchecked. The new seedling varieties M 45 and L 21, both of which show commercial promise, completely resisted the disease, as did about 12 others, the cones remaining green while those of adjoining varieties turned brown.

MARCHAL (P.) & FOËX (E.). **Rapport phytopathologique pour l'année 1930.** [Phytopathological report for the year 1930.] —*Ann. des Épiphyties*, xvii, 1, pp. 1–112, 1931.

This report on the phytopathological situation in France in 1930, which is on the same lines as those for previous years [cf. *R.A.M.*, x, p. 10], contains very numerous items of interest, some of which have already been noted from other sources, and only a few of which can be referred to here.

Ring spot of tobacco [ibid., x, pp. 60, 132, 615] was observed in the vicinity of Erstein and Obernai (Bas-Rhin). *Ascochyta pisi* attacked 'Très hâtif d'Annonay' peas at Versailles in July, while in August it severely affected Caractacus and 'Téléphone' peas. All three varieties were killed off by September. Isolations from leaf and pod lesions gave *A. pisi* while those from the collar gave *Mycosphaerella pinodes* [ibid., x, pp. 284, 586].

The mildew of melons caused by *Erysiphe polygoni* [ibid., x, p. 289] is the most serious disease of this host in Provence, and in 1930 caused heavy losses in Vaucluse, where the growers attempt to control it by preventive treatment with sulphur and curative measures with potassium permanganate. The sulphur is frequently applied in the form of cupric sulphosteatite dust and while some varieties, such as Charentais and Montauban, tolerate sulphur, others, such as the cantaloupe melon, may sustain severe injury.

In a detailed note of the severe invasion of vine mildew (*Plasmopara viticola*) which occurred during the period under review [ibid., x, p. 579] it is stated that the Bordeaux station of agricultural information observed six main invasions [the dates of which are given] between 11th May and 18th July. The two infections which caused most damage to the leaves and fruit took place on 11th and 24th June.

Some of the soft-wooded varieties of poplar, notably that known as 'Vieux noir du pays' or 'Peuplier du pays', which appears to belong to the *Populus balsamifera* type, show moderate resistance to canker [attributed by Delacroix to *Micrococcus populi*: ibid., x, p. 567], which appears to extend from the Somme valley, in the vicinity of Amiens and Bray as far as the Aisne, near Soissons,

but is also present in the valleys of the rivers Ourcq, Petit Morin, and Grand Morin, while there are isolated foci of infection in Oise, Seine-Inférieure, Aube, Marne, and elsewhere. Dutch elm disease (*Graphium ulmi*) [cf. ibid., x, p. 277] continues to be prevalent throughout France. According to Guinier, *Ulmus montana* is more resistant than *U. campestris* [cf. ibid., x, p. 695], which is attacked when growing in forests even on the richest soil. Elms growing in parks and along roads and canals [loc. cit.] are still more liable to become infected; dry and impacted soils, for example, reduce the resistance of the trees, while wounds also diminish their vitality.

Ailanthus glandulosa trees in Paris are still suffering from the dying-off disease previously reported [ibid., ix, p. 753] as being caused by *Verticillium dahliae*.

Infections of a type of *Anemone coronaria* intermediate between the cultivated and wild forms with *Tuburcinia antipolitana* were obtained experimentally for the first time, the fungus effecting penetration only at germination; after a month to six weeks the pustules of *T. antipolitana* appeared on the swollen collar of the plant.

Further investigations into the relations between walnut root rot (*Armillaria mellea*) and limestone deficiency in the soil [ibid., vii, p. 686] confirm the observation that the richer the soil is in this element the less severe is the disease, which tends to disappear when the soil contains 20 per cent. of lime.

Van Poeteren (N.). **Verslag over de werkzaamheden van den Plantenziektenkundigen Dienst in het jaar 1930.** [Report on the activities of the Phytopathological Service in the year 1930.]—*Versl. en Meded. Plantenziektenkundigen Dienst te Wageningen*, 64, 189 pp., 8 pl., 1 fig., 2 diags., 1 graph, 1931.

This report, prepared on the usual lines [*R.A.M.*, x, p. 293], contains a number of interesting items, of which the following may be mentioned. Rape [*Brassica napus*] stems and roots submitted for examination were found to be heavily infected by *Rhizoctonia*, while *Phoma* pycnidia were also present. The latter are believed to be those of *P. brassicae* or *P. oleracea* [*P. lingam*: ibid., vii, p. 71; x, p. 327], which is transmissible by the seed and may be controlled by 30 minutes' immersion in 0·125 per cent. germisan. Only in a few cases was the pathogen detected on the cotyledons, but within 14 days of germination small brown stripes appeared on the stems, and pycnidia rapidly developed under humid conditions. Up to 50 or 60 per cent. infection was found in some lots of seed.

Pear branches were attacked by *Phomopsis* (*Diaporthe*) *ambigua*, which is stated to be of very rare occurrence in Holland [ibid., ii, p. 53].

Three-year-old mulberry trees were infected by a fungus apparently identical with *Gibberella moricola* (*Fusarium lateritium*), the cause of heavy damage to the same host in Italy [ibid., v, p. 15]. The diseased leaves are characterized by a blackening of the edges.

The Dutch iris variety, Jacob de Wit, was attacked at Leyden

by *Sclerotium delphinii* [ibid., ix, p. 529]. *Gloeosporium allescheri* caused exceptionally severe injury to a number of *Kentia* palms at a large commercial nursery in Amsterdam.

Juniperus and *Biota* [*Thuja*] seedlings at Doorn suffered from an extensive die-back which is tentatively attributed to a strain of *Phomopsis juniperovora* [ibid., x, p. 569]. *T. gigantea* at Bussum showed infection by *Keithia* [*Didymascella*] *thujina* [ibid., ix, p. 145].

The section of the report dealing with investigational work contains notes, *inter alia*, on experiments in the control of various seed-borne diseases of cereals, flax, and beet [ibid., xi, p. 64], and of the 'grease spot disease' [*Bacterium medicaginis* var. *phaseolicola*: ibid., x, p. 423] of beans [*Phaseolus vulgaris*], and particulars of studies on potato virus diseases. Further details are given concerning the work of the 'cautionary service', acting in collaboration with the Royal Dutch Meteorological Institute, in the issue of warning notices advising growers of impending attacks of potato blight [*Phytophthora infestans*: ibid., ix, p. 16]. In North Holland the disease was unusually severe following critical days on 1st and 12th July, while a wide extension was also reported from the Scherpenisse district of Zealand after a critical day on 24th July. In South Holland heavy infection occurred after 24th and 25th July and 3rd and 5th August.

The symptoms of the yellowing disease of beets [ibid., x, pp. 293, 488] are stated to run a somewhat different course on clay and on sandy humus soils, reaching a climax on the former towards the close of the growing season, while on the latter they culminate at the end of July or beginning of August, so that by the autumn the plants have almost entirely recovered. Notes are given on two other types of beet leaf discoloration, one of which is believed to be merely a variant of the yellowing disease while the other, characterized by a pale green tinge and small, white, 'shot hole' spots, appears to be distinct.

At Hilversum *Ulmus plumosa* [var.] *fastigiata* has so far remained free from infection by *Graphium ulmi*. In Amsterdam *U. umbraculifera* and *U. rueppellii* have been found the most susceptible varieties; during the years 1927 to 1929, inclusive, 587 of the 30,000 elm trees in this city died.

Douglas firs [*Pseudotsuga taxifolia*] in various parts of the country have been found to be attacked by *Rhabdocline pseudotsugae*, but Schuphan's report of the occurrence of this fungus in nurseries at Boskoop [on *Abies* spp.] is again stated to be without foundation [ibid., x, p. 571].

McCurry (J. B.). **Report on the prevalence of plant diseases in the Dominion of Canada for the years 1927 and 1928.**— *Canada Dept. of Agric., Exper. Farms Branch*, 114 pp., [? 1931]. [Mimeographed.]

Notes are given on the occurrence of fungous, bacterial, and non-parasitic diseases on cereals, fodder crops, potatoes and other vegetables, fruit, forest and shade trees, tobacco, and ornamental plants in Canada during the years 1927 and 1928 [cf. *R.A.M.*, x, p. 360].

DEIGHTON (F. C.). **Mycological work.**—*Ann. Rept. Agric. Dept. Sierra Leone for the year 1930*, pp. 28–31, 1931.

Sphacelia disease, apparently identical with that recorded from the Gold Coast, was observed for the first time in Sierra Leone on bulrush millet [*Pennisetum typhoideum*] at Njala [*R.A.M.*, vii, p. 712].

Ear rot of maize, caused by *Diplodia* (?) *macrospora* [ibid., ix, p. 712], was prevalent at Njala at the end of 1929. The ears inside the husks were covered with a white, woolly mycelium, and pycnidia were formed on the husks and over the ears.

Both in 1929 and 1930 specimens of upland and swamp rice infected by a fungus probably identical with *Ustilaginoidea virens* [ibid., x, p. 684] were received from Njala and Shenge.

The *Marasmius* previously reported to be attacking the pseudostems of Guinea Negro and (to a lesser extent) of Canary bananas on low-lying, heavy soils in the Northern Province [ibid., ix, p. 19] has been identified as *M. stenophyllus* Mont. (*M. semiustus* Mass.) [ibid., xi, p. 25]. Plantains [*Musa paradisiaca*] planted near the diseased bananas were found two months later to be infected by the same fungus.

A species of *Gloeosporium* [? *G. manihotis*: cf. ibid., vii, p. 15] was apparently responsible for a die-back of cassava twigs.

Young grapefruit leaves and Genoa lemon fruits were attacked by scab [*Sporotrichum citri*: ibid., x, p. 81], which was also fairly common on the leaves and fruit of old rough lemon trees at Njala. Young lemons in the same place were severely attacked during the latter part of 1930 by *Gloeosporium*.

Fomes lamaoensis was found on dead kola [*Cola acuminata*] trees which were probably killed by the fungus, near Port Loka [cf. ibid., x, p. 80].

Bush greens (*Amaranthus*), carrots, and turnips were attacked by *Rhizoctonia* [*Corticium*] *solani*, which was also found causing the die-back of leaves and young stems of chilli [*Capsicum annuum*] and *Thevetia neriifolia*.

CUNNINGHAM (H. S.). **Report of the Plant Pathologist, 1930.**—*Rept. Dept. of Agric., Bermuda, for the year 1930*, pp. 33–39, 1931.

Notes are given on the incidence of insect pests and fungous diseases on cultivated plants in Bermuda during 1930, among which may be mentioned powdery mildew of beans [*Phaseolus vulgaris*] caused by *Erysiphe polygoni*, black rot of cabbage and other crucifers [*Pseudomonas campestris*], and *Phytophthora* rot, mosaic, and yellow flat of lilies [*R.A.M.*, vi, p. 716; x, p. 667].

BLAIN (W. L.). **A list of diseases of economic plants in Alabama.**—*Mycologia*, xxiii, 4, pp. 300–304, 1931.

This is a simple enumeration of all the economically important parasitic and non-parasitic diseases which are so far known to occur on 86 species of cultivated plants and trees in the State of Alabama, listed in the alphabetical order of the common names of their hosts.

JOHNSON (DELIA E.). **The antibiosis of certain bacteria to smuts and some other fungi.**—*Phytopath.*, xxi, 9, pp. 843–863, 6 figs., 1931.

A full account is given of the writer's investigations at St. Paul, Minnesota, on four types of bacteria which are antibiotic to certain smuts and other fungi [*R.A.M.*, ix, p. 373 and below, p. 103]. They consist of a Gram-negative, non-motile coccus isolated from oat smut (*Ustilago avenae* and *U. levis* [*U. kolleri*]) and maize smut (*U. zeae*) sori; a motile, non-spore-bearing, rod-like bacterium, also associated with the foregoing smuts; a motile, spore-bearing, rod-like bacterium found as a contamination in black chaff [*Bacterium translucens* var. *undulosum*] cultures; and a *Myxobacterium* also occurring in association with black chaff.

The presence of these organisms inhibited the full development of cultures of various fungi, in some of the smuts apparently because they produced enzymes capable of causing the dissolution of the sporidial cell walls. Additional factors are evidently involved in the antibiotic property, since certain other bacteria with the same type of enzymes failed to affect the sporidia of the identical smuts. The results of experimental work with cultures of all the above-mentioned organisms except the *Myxobacterium* indicate that the infection of maize by *U. zeae* may be inhibited to some extent by their use under proper conditions. The bacterium associated with *Bact. translucens* var. *undulosum* also prevented the development of *Pyronema* and other species of soil fungi.

GASSNER (G.) & HASSEBRAUK (K.). **Untersuchungen über die Beziehungen zwischen Mineralsalzernährung und Verhalten der Getreidepflanzen gegen Rost.** [Investigations on the relations between mineral salt nutrition and reaction of cereal plants to rust.]—*Phytopath. Zeitschr.*, iii, 6, pp. 535–617, 3 diags., 6 graphs, 1931.

A detailed account, accompanied by 27 tables, is given of the writers' experiments at the Brunswick Botanical Institute on the influence of mineral salts on the incidence of rust in cereals [cf. *R.A.M.*, ix, p. 442].

The most suitable material for these investigations was found to consist of seedlings of moderately resistant or moderately susceptible varieties, in which the rust symptoms were modified to a much greater extent by the different minerals than was the case with either the highly resistant or the very susceptible.

All the rusts used, viz., *P. triticina*, *P. glumarum* f. *tritici*, and *P. graminis* f. *tritici* on wheat, *P. coronifera* [*P. lolii*] on oats, *P. dispersa* [*P. secalina*] on rye, and *P. simplex* [*P. anomala*] on barley, responded in virtually the same manner to the action of mineral salts.

Generally speaking, heavy doses of nitrogen definitely prolonged the sporing period of the rusts, except in the case of *P. graminis* on the Hessian local variety of wheat. Increasing doses of potash resulted in an accession of resistance to rust when the other nutrient substances remained constant. A still more marked effect was observed when the dose of potash was increased while simultaneously the nitrogen and phosphoric acid applications were

reduced. Nitrogen always promoted the development of rust, but this action was most evident when the nitrogen was applied in excess of potash and phosphoric acid. In the neutral soil used for the tests the highest incidence of rust generally followed the application of ammonium salts, the effects of the nitrates of calcium, sodium, and potassium being less marked. In fact, the two last-named salts, applied in excess, may lead to an increase of resistance. The action of phosphoric acid is always dependent on the amounts of potash and nitrogen simultaneously available. Increased resistance occurs when phosphoric acid is present in excess over potash and nitrogen.

In judging the effect of the mineral salts on the reaction of cereals to the rust fungi, attention must be paid to the assimilatory activity of the leaves as a variable factor. Heavy rust infection is primarily dependent on liberal nitrogen applications and at the same time on adequate assimilatory activity. Since the albuminous nitrogen content of the leaves is particularly high under these conditions, there is a clear correlation between susceptibility to rust and the albumin content of the foliage. The rust-reducing action of heavy doses of potash also appears to be connected with the albumin supply of the foliage, since plants receiving an excess of potash show a decline of the albumin content.

A bibliography of 108 titles is appended.

PASINETTI (L.). **Le teleutospore di 'Puccinia graminis' e la loro refrattarietà all'azione dei raggi X.** [The teleutospores of *Puccinia graminis* and their insensibility to the action of X-rays.]—*Riv. Pat. Veg.*, xxi, 5–6, pp. 137–143, 1931.

One series each of dry and damp teleutospores of *Puccinia graminis* were exposed [by a method which is indicated] for periods of 10 to 30 minutes to X-rays, duplicate sets being exposed to ultra-violet rays of a wave length of 3,650 Angström obtained by Wood's filter, and remaining unexposed. A fortnight later the first two batches were submitted to a second exposure. After a further fortnight a few of the teleutospores exposed to the ultra-violet rays showed a faint discoloration at the apex; on the twenty-fifth day after the second irradiation, some of the teleutospores treated with the ultra-violet rays emitted a short promycelium from the discoloured part of the apical cell. There was, however, no subsequent formation of basidiospores. The proportion of spores which germinated was about 4 to 5 per cent.

The untreated controls and the teleutospores exposed to the X-rays showed no sign of germination even after being kept for one month in damp conditions.

The effect obtained with Wood's rays is considered to confirm the similar results published by Sibilia [*R.A.M.*, x, p. 171].

CHURCHWARD (J. G.). **Studies in the inheritance of resistance to bunt in a cross between Florence × Hard Federation Wheats.**—*Journ. & Proc. Roy. Soc. New South Wales*, lxiv, pp. 298–319, 1 graph, 1931.

While stating that wheat bunt (predominantly *Tilletia tritici* [*T. caries*]) in New South Wales is readily controlled by the dis-

infection of the seed-grain with copper carbonate, in spite of the fact that the three most popular varieties of wheat grown there are very liable to infection, the author points out the costliness of this method, estimates showing that approximately £70,000 were spent in that State in 1930 on seed disinfection alone. After a brief review of the work hitherto done in breeding bunt-resistant varieties [*R.A.M.*, ix, pp. 514, 515; x, p. 19], he gives details of his observations on the behaviour of the F_3 generation of a cross between the resistant Florence and the susceptible Hard Federation varieties at Glenfield in 1928. The results [which are presented in tabular and graphic forms] indicate the presence of a one factor difference for resistance to bunt between the two varieties, susceptibility acting as a dominant factor. In the F_3 generation the three classes, homozygous resistant, heterozygous susceptible, and homozygous susceptible, gave an approximation to a ratio of 1 : 2 : 1. In the cross studied, the inheritance of bunt resistance, production of grass tufts [sterile plants], and tip-beardedness appears to be controlled by simple independent Mendelian factors.

PETIT (A.). **La désinfection à sec des semences du Blé contre la carie.** [Dry disinfection of Wheat seed against bunt.]—*Rev. Path. Vég. et Ent. Agric.*, xviii, 6, pp. 224–226, 1931.

The author states that seed treatment with steatite dust containing 15 per cent. cupric chloride is not only highly efficacious against bunt [*Tilletia caries* and *T. foetens*] but is also very economical, this dust containing only about 5 per cent. copper, equivalent to 15 gm. of the metal per quintal of seed treated [*R.A.M.*, ix, p. 637]. Tests made under both experimental and field conditions during a period of three years using seed contaminated to the extent of 0·1 and 0·5 per cent. bunt spores gave only 0·2 and 0·7 per cent. bunted ears, for each lot of seed respectively, as compared with 33 and 61 per cent. bunt in the untreated controls. The corresponding figures for the two lots of contaminated seed when dusted with copper oxychloride (59 per cent. copper), neutral copper acetate (32 per cent. copper), basic copper carbonate (57 per cent. copper), and cupric steatite containing 30 per cent. cupric chloride (11·6 per cent. copper) were, respectively, 0·6 and 4·9, 2·2 and 10·8, 1·3 and 12·2, and 0·3 and 0·9 per cent.

Two tests made with cupric steatite dust containing 11 per cent. cupric chloride on oat seed contaminated with *Ustilago avenae* gave an average of only 1·5 per cent. smutted ears as compared with 11 per cent. in the untreated controls.

PASINETTI (L.). **Ricerche anatomo-fisiologiche sulla 'punta nera' del Frumento argentino 'San Martin'.** [Anatomical and physiological researches on black point of San Martin Argentine Wheat.]—*Riv. Pat. Veg.*, xxi, 5–6, pp. 145–156, 4 pl., 1931.

Wheat of the awned Argentine variety San Martin, stated to be affected with a form of black point [*R.A.M.*, i, p. 289], showed no external signs of disease on the ears, but revealed a blackening along about one-fourth of the base of the glumes, together with a

similar discoloration of the scutellum, extending to about one-third of the dorsal side of the grains. The ears themselves were of normal dimensions and completely developed. The disease was evidently similar to that described by Peyronel as 'puntatura' [ibid., v, p. 355] and not the ordinary (apical) form of black point.

Sections of the affected inflorescences showed no hyphae in the discoloured pericarp tissues. The discoloration was most marked in the region of the mesocarp and endocarp, especially in the sections made nearest the scutellum; it was also very marked in the two internal layers of the pericarp, though no hyphae were present. The aleurone layer revealed nothing abnormal, though the cells were very turgid. No trace of any abnormality or lesion could be detected in the tissues of the embryo.

Infected material sown on various media did not give a growth of any of the organisms usually associated with black point, while germination tests further demonstrated that the condition in no way adversely affected the germinability of the seed. Affected inflorescences gave rise to plants with perfectly healthy ears and grains.

The author concludes that the discoloration of the scutellum was not due to *Cladosporium*, *Alternaria*, *Helminthosporium*, or bacteria. In tissues other than those of the scutellum the discoloration spread in the mesocarp in the groove of the grain and up the sides of the groove for some distance. The condition is regarded as purely physiological and resulting from adverse environmental (perhaps climatic) conditions.

A bibliography of 16 titles is appended.

JESSEN (W.). **Die Marmorierung der Blätter der Getreidearten, eine Magnesiummangelerscheinung.** [The mottling of the leaves of cereal species, a magnesium deficiency phenomenon.]—*Zeitschr. für Pflanzenernährung, Düngung und Bodenkunde*, A, xxii, 3–4, pp. 129–135, 3 figs., 1931.

Oats, wheat, rye, and barley growing on light, sandy soil with an admixture of clay at Dahlem, Berlin, and on acid soils in Pomerania and West Prussia are stated to develop a pronounced mottling, chlorosis, and rolling of the foliage, accompanied (in the case of barley) by symptoms closely resembling those of grey speck [*R.A.M.*, viii, p. 304]. Field and pot experiments [which are described and the data tabulated] showed that the condition in question is due to magnesium deficiency, resulting in metabolic disturbances associated with the excessive accumulation of ammonium nitrogen.

HONECKER (L.). **Beiträge zum Mehltauproblem bei der Gerste mit besonderer Berücksichtigung der züchterischen Seite.** [Contributions to the mildew problem in Barley with special reference to the selective aspect.]—*Pflanzenbau, Pflanzenschutz u. Pflanzenzucht*, viii, 3, pp. 78–84; 4, pp. 89–106, 10 figs., 1931.

A comprehensive and fully tabulated account is given of the writer's investigations and experiments at Weihenstephan, Bavaria,

on the reaction of a number of barley varieties to mildew (*Erysiphe graminis*) [*R.A.M.*, ix, p. 643], with special reference to the work of selection for resistance to this disease.

It was shown by qualitative analyses, conducted over an unbroken period of ten years, that the high degree of resistance in the Pflug's Intensiv variety is correlated with a low albumin content and abundant reserves of starch. The fact that in pot experiments this variety retained its turgescence after inoculation with *E. graminis*, while the susceptible Heils Franken H_1 was severely wilted, is considered to indicate that mildew infection is not the result but the cause of loss of turgor [cf. ibid., iv, pp. 108, 751].

Full details are given of inoculation experiments with conidial suspensions of the fungus on 306 standard barley varieties [which are enumerated]. At a mean room temperature of 10° C. the incubation period of the disease was 8 days, while at 17° it was only 4 days. Inoculations were made from 10th to 14th April, 1931, on 163 summer varieties (4 plants of each), all of which, with the exception of Pflug's Intensiv, which was immune, and *Hordeum commune* nud. pol. vulg. A. spur. (highly resistant), were in an advanced stage of infection by 24th May. Of the 10 Lithuanian varieties inoculated on 26th April, one plant of *H. distichum* [var.] *nutans* remained healthy while *H. zeocrithum* was only slightly infected, the remainder being heavily attacked. Eight plants each of a further 43 varieties were inoculated on 9th May and 16 each of another 11 on 11th May. Of these a fodder barley (75a) from the Estanzuela (Uruguay) seed selection station showed considerable resistance, while another (72d) of the same origin was slow in succumbing to infection and retained its green coloration longer than the other varieties. Of the 47 (mostly foreign) varieties inoculated on 12th May (8 plants of each), a high degree of resistance was shown by Sagira London Egypt and another lot of the Uruguayan fodder barley (75a). All the 27 winter barley varieties tested proved highly susceptible to mildew.

The results [which are fully discussed] of hybridization experiments between the resistant Pflug's Intensiv and the susceptible Criewener 403 and Heil's Franken H_1 varieties showed that some of the plants were homozygous for resistance and others heterozygous, resistance being recessive.

SPITZER (G.) & DIEHM (M. M.). **Preliminary studies of the enzymes of Gibberella saubinetii.**—*Journ. Agric. Res.*, xliii, 3, pp. 223–229, 1931.

The studies briefly described in this paper indicated the presence in *Gibberella saubinetii* (grown on a medium consisting of 4 per cent. malt extract and 0·2 per cent. nitrate of soda) of the enzymes glucosidase, invertase, and lipase, while tests for urease, amylase, and cellulase failed to give positive results. The enzyme material obtained from mycelial growth of the fungus showed a decided catalase reaction, and its extract readily hydrolysed casein and gelatin at P_H 9 and 6, but not at 3, indicating the presence of proteolytic enzymes, especially trypsin and erepsin.

THIEME (P.). **Ueber Mutterkorn in Getreide, Mehl und Brot, seinen Nachweis und die Verhütung von Mutterkornvergiftungen.** [On ergot in cereals, flour, and bread, its detection, and the prevention of ergot poisoning.]—*Arb. Reichsgesundheïtsamte*, lxiii, 1–2, pp. 211–250, 9 figs., 1931.

In this paper (reprinted from *Veröffentlichungen aus dem Gebiete der Medizinalverwaltung*, xxxiii, p. 1, 1930) a comprehensive account is given of the various clinical manifestations of ergot (*Claviceps purpurea*) poisoning, together with a brief history of the disease from the earliest times, medical and legal considerations, notes on recent epidemics, and the pharmacological, microscopic-histological, chemical, and spectroscopic methods of detecting the presence of the fungus in rye flour and bread [ibid., xi, p. 38].

A useful bibliography of 101 titles is appended, arranged under the various headings indicated above.

[NATTRASS (R. M.).] **The smut disease of Maize.**—*Cyprus Agric. Journ.*, xxvi, 3, pp. 81–82, 1 fig., 1931.

Attention is drawn to the occurrence of maize smut [*Ustilago zeae*] in various parts of Cyprus during 1931. The symptoms of the disease are briefly described in popular terms.

BAMBERG (R. H.). **Bacteria antibiotic to Ustilago zeae.**—*Phytopath.*, xxi, 9, pp. 881–890, 1 fig., 1 graph, 1931.

This is an expanded account of the writer's investigations on the action of a bacterium isolated from maize plants at St. Paul, Minnesota, in the prevention of normal infection by maize smut (*Ustilago zeae*) and the destruction of colonies of the fungus on artificial media [*R.A.M.*, ix, p. 373 and above, p. 98].

UPPAL (B. N.) & DESAI (M. K.). **The effectiveness of dust fungicides in controlling grain smut of Sorghum.**—*Agric. & Livestock in India*, i, 4, pp. 396–413, 1931.

A tabulated account is given of the writers' experiments from 1927 to 1930 in the control of grain smut (*Sphacelotheca sorghi*) of Nilva fodder sorghum in the Bombay Presidency by dust treatments [*R.A.M.*, x, p. 585].

Copper carbonate dust (53 per cent. copper) at the rate of 2 oz. or more to 60 lb. of seed-grain gave effective control of smut for all spore dosages, while even 1 oz. sufficed when the seed was not blackened with spores. The dust caused no injury to seed germination. Copper sulphate dust (British Sulphate of Copper Association, London) was equally effective with copper carbonate in the control of sorghum smut, but owing to its absorption of moisture from the air it does not retain its powdered form for long. Sulphur dust (Dharamsi Morarji Chemical Co., Bombay), however, gave the best results in smut control in district trials made throughout the Presidency, and is probably the most suitable for the purpose, being much cheaper than copper carbonate or copper sulphate. Of the two brands tried, 'fungus' sulphur (200-mesh) was slightly superior to sulphur-A (100-mesh) and gave very effective control when used at the rate of 3 to 4 oz. to 60 lb. seed-grain. Even at 20 oz. or more to 60 lb. it caused no

injury to the seed. The cost of sulphur treatment in the area under discussion is less than one pie [a fraction of a farthing] per acre. Buffalo calves fed on sulphur-dusted sorghum grain throve and showed a gain in weight.

UPPAL (B. N.). **India: Rhizoctonia bataticola on Sorghum in the Bombay Presidency.**—*Internat. Bull. of Plant Protect.*, v, 9, p. 163, 1931.

During the winter of 1930-1 the sorghum crop in the East Deccan, India, was extensively damaged by *Rhizoctonia bataticola* [*Macrophomina phaseoli*], which in many places reduced it to one quarter of the normal. This disease is also serious near Broach in Gujarat, where it is known as 'kharkharia'. Tobacco and cotton are also believed to be infected by the fungus in the latter district.

HAHNE (B.). **Report on inspection of packing-houses in various South African Citrus areas.**—*S. Africa Dept. of Agric. Bull.* 98, 20 pp., 1931.

In this paper (to which Dr. I. B. Pole Evans contributes a foreword under the title of 'Handling of Citrus fruits in relation to subsequent wastage') the writer gives full details of his inspections during 1930 of eight packing-houses in the citrus-growing regions of the Transvaal and Cape Province.

The main conclusion reached from an investigation of the conditions in the packing-houses is that the slight or extensive wastage occurring in each is due to preventable causes either in the grading and sizing machinery, in handling methods, or in the picking of the fruit and its conveyance to the packing-house. The practice of allowing the oranges to wilt for a week in order to show up insect stings was found to be responsible for a considerable development of blue and green moulds [*Penicillium italicum* and *P. digitatum*: *R.A.M.*, ix, p. 449; x, p. 517], the spores of which are ubiquitous and increase in numbers with the advance of the season. It was noticed that the grading belts and lifting rollers were covered with bluish-green patches, evidently as a result of mould impregnation from the decaying fruit. The only condition definitely requiring scientific investigation is considered to be the creasing and puffiness of the rind of the fruit which is prevalent in various parts of the Union and has not yet been correlated with any particular cultural, soil, or climatic factor [ibid., ix, p. 450]. A number of suggestions are made for improved methods of handling the fruit.

The export of Citrus fruit: recommendations by Citrus Preservation Committee.—*Journ. Australia Council Sci. & Indus. Res.*, iv, 2, pp. 96–99, 1931.

This paper gives the recommendations of the Australian Citrus Preservation Committee concerning the manner in which citrus fruit intended for export should be handled, the points dealt with including export regulations, type of fruit, methods of dealing with it in the grove and packing house, transport by rail and ship, pre-cooling, and general instructions. Where proper washing

facilities exist, the Committee advise immersing the fruit for 8 minutes in a 5 per cent. solution of sodium bicarbonate at 112° to 120° F. and subsequently drying on towel driers as a safeguard against infection by moulds [chiefly *Penicillium* spp.: *R.A.M.*, ix, p. 775; see also ibid., x, p. 451].

DOIDGE (ETHEL M.). **Sooty blotch in Oranges.**—*Farming in South Africa*, vi, 65, pp. 173–174, 2 figs., 1931.

Oranges in the so-called 'mist belt' of the northern Transvaal are liable to considerable disfigurement by sooty blotch (*Gloeodes pomigena*) [*R.A.M.*, xi, p. 21], which may be removed by either of the following processes. (1) The fruit should be dipped for two minutes in a 2·5 per cent. solution of bleaching powder containing 33 to 37 per cent. available chlorine, left to stand for 30 minutes, and then redipped, since the bleaching principle (calcium hypochlorite) becomes active after removal from the solution. The bleaching powder may be obtained at a cost of 13 shillings per 100 lb. f.o.r. Durban or 17*s.* 9*d.* f.o.r. Johannesburg, and the estimated cost of the treatment is one penny per case exclusive of labour. (2) Half a minute's immersion in full strength or 10 minutes at half strength Eau de Javelle (15 per cent. anhydrous potassium carbonate or 30 per cent. crystalline sodium carbonate solutions with 20 per cent. bleaching powder suspension). The latter treatment removed all trace of blotch, while two minutes at half strength also gave good results.

VAN DER PLANK (J. E.). **Exanthema of Citrus.**—*Farming in South Africa*, vi, 66, pp. 219–220, 4 figs., 1931.

The first case of exanthema in citrus [*R.A.M.*, x, p. 24] in South Africa was observed two years ago. The disease is now known to occur in the eastern Transvaal and Cape Province, being common near Bathurst. The symptoms of exanthema and their relations to cultural conditions are briefly discussed. They include severe stunting, very deep colouring of the leaves, brown, glossy, gum-soaked areas on the fruit (which is often pale yellow), blister-like pockets of amber-coloured gum on young shoots, the production of multiple buds, shortened internodes, and a bushy appearance of affected shoots.

THOMPSON (A.). **Stem-rot of the Oil Palm in Malaya.**—*Straits Settlements and Federated Malay States Dept. of Agric. Bull. Scient. Ser. 1931*, No. 6, 23 pp., 7 pl., 1931.

Further investigation of the serious stem disease of the oil palm (*Elaeis guineensis*) in Malaya, a preliminary note on which has already been noticed [*R.A.M.*, ix, p. 648], showed the condition to be associated with the following fungi: (*a*) a species of *Fomes* resembling *F. pachyphloeus* [ibid., viii, p. 292] but also like certain described forms of *F. lamaoensis*, which was invariably found on diseased palms, and the fructifications of which usually develop between the leaf bases; (*b*) *F. applanatus* [*Ganoderma applanatum*] which is fairly common on stumps and fallen timber all over the country; (*c*) *G. lucidum*; and (*d*) the conidial stage of *Ceratostomella paradoxa* [ibid., x, p. 525]. The last-named frequently

develops on the bases of leaves that are pruned off during harvest, but does not seem to penetrate as far as the stem tissue, and frequently only causes a central rot of about 2 inches deep ; when the diseased tissue finally dries up, however, it is soft and in a state likely to allow entry to drops of water carrying spores of parasitic fungi.

The work also included a study of the organisms in pure culture [some details of which are given], and inoculation experiments which, together with field observations, indicate that the *Fomes* resembling *F. pachyphloeus* is the probable cause of the disease, though the two species of *Ganoderma* may possibly act also as wound parasites. The paper terminates with a discussion of control measures, and recommendations for prevention and treatment of the disease.

AGOSTINI (ANGELA). **On Blastomycoides lanuginosus Castellani.** —*Journ. Trop. Med. & Hygiene*, xxxiv, 17, pp. 287–288, 2 figs., 1931.

An account is given of the writer's investigations on cultures of *Blastomycoides lanuginosus* [*R.A.M.*, x, p. 27] which were sent by Castellani from the United States to the Botanical Institute of the University of Pavia. Growth on various media is profuse, velvety, lanuginous, white at first and later slightly yellowish or brownish. The hyphae are hyaline, sparsely branched, septate, and 2 to 7 μ in thickness. The oblong, generally apiculate, hyaline, usually single aleurioconidia, 7 to 11 by 3 to 6 μ, are formed at the extremities of unbranched hyphae. Arthroconidia, measuring up to 15 or 18 μ in diameter, are usually present. The optimum temperature for growth is 25° to 30° C.

The genus *Blastomycoides* was placed by Castellani in the Oosporaceae [*R.A.M.*, viii, p. 103] which are, however, characterized by the formation of true conidia, whereas *B. lanuginosus* only produces aleurioconidia and should, therefore, be placed in Vuillemin's family Aleurismataceae. It is transferred to the genus *Glenospora* as *G. lanuginosa* n. comb.

NANNIZZI (A.). **'Glenosporella', nuovo genere di 'Hyphales'.** [*Glenosporella*, a new genus of the Hyphales.]—*Atti R. Accad. Fisiocritici Siena*, Ser. X, vi, 3–4, pp. 268–273, 1931.

The author gives Latin diagnoses of the new genus *Glenosporella* Nannizzi 1931, *G. albiscicans* (Nieuwenhuis) Nannizzi, and *G. dermatitidis* Agostini [*R.A.M.*, x, p. 458]. He also proposes a modified classification of the Hyphomycetes into four sub-orders, viz., Thalloconidiales, Hemiconidiales, Aleurioconidiales, and Euconidiales, the propagative bodies of which are thalloconidia, hemiconidia, aleurioconidia, and euconidia, respectively.

DHAYAGUDE (R.). **Y a-t-il une électivité cutanée des teignes animales ?** [Is there a cutaneous electivity in animal ringworms ?]—*Ann. de Parasitol. Humaine et Comp.*, ix, 4, pp. 359–371, 1931.

The author claims to have established by experiments on guinea-pigs [some details of which are given], inoculated hypo-

dermically and intraperitoneally with spore suspensions of *Ctenomyces* (*Trichophyton*) *mentagrophytes* and *Sabouraudites felineus* [*R.A.M.*, x, p. 243], that these dermatophytes have no pathogenic action on any tissue of the animal's body, with the sole exception of the skin [cf. ibid., viii, p. 506]. Inoculation by this method never led to the development of lesions in the skin, even when the latter was scarified, whereas direct inoculation on the scarified skin was successful, except when done on the site of a fairly recent previous lesion that had healed spontaneously. It was also shown that hypodermic or intraperitoneal injections did not produce immunity from the disease or allergy in the animals.

MORSTATT (H.). **Degeneration bei Kulturpflanzen und die Frage ihres Vorkommens bei Sisal.** [Degeneration of cultivated plants and the question of its occurrence in Sisal.]—*Der Tropenpflanzer*, xxxiv, 3, pp. 95–99, 1931.

The recent increase of disease among the sisal [*Agave rigida* var. *sisalana*] plantings of Tanganyika [*R.A.M.*, x, p. 382] is widely attributed to ecological degeneration, but the writer finds that this theory is based on insufficient evidence. In his opinion, the phenomenon in question is associated with a temporary sequence of adverse climatic conditions, and not with any inherent tendency to deterioration.

THOROLD (C. A.). **Fusarium wilt disease of Sunn Hemp. II.**—*Trop. Agriculture*, viii, 7, pp. 176–177, 2 figs., 1931.

Continued investigation in 1929–30 of the wilt disease of sunn hemp [*Crotalaria juncea*] in Trinidad, attributed to a species of *Fusarium* which is considered probably to be a biological strain of *F. vasinfectum* [*R.A.M.*, x, p. 799], showed that the fungus does not infect cotton, cowpea, Bengal bean [*Mucuna aterrima*], sword bean [*Canavalia ensiformis*], or pigeon pea. Measurements of infected plots indicated that when a non-susceptible crop is grown the organism does not spread in the soil, but it has not yet been established whether a long rotation actually decreases the degree of soil infection; a rotation interval of 16 months in the experimental field did not have this effect. Observations further showed that on limed soil, giving an alkaline reaction, both the density of stand of sunn hemp and the percentage of wilt were increased, but this may have been due to the easier spread of the fungus in the soil, owing to more intimate root contact of the plants. The rate and distance of spread of infection from a given focus was found to be directly proportional to the intensity of infection at that centre. Manurial treatment was again shown to have no appreciable effect on the incidence of wilt.

WARE (W. M.). **A blossom wilt of Lavender caused by Botrytis cinerea.**—*Journ. South-Eastern Agric. Coll., Wye, Kent*, xxviii, pp. 206–210, 2 figs., 1931.

Lavender in Kent and Somerset is affected by a wilt in which, while the flower buds are still green or about to open, the stalks below the inflorescences shrink and turn brown, later drying up and causing the blossom heads to hang down limply. No other

part of the plants appears to be affected. When some of the stems were kept under moist conditions *Botrytis cinerea* developed on the affected parts.

In culture two strains of the organism were apparently isolated, as on the same medium one immediately formed conidiophores and the other sclerotia. The latter, which were eventually produced in both sets of cultures, germinated by producing tufts of conidiophores.

Five out of nine inoculations in which the mycelium of the fungus was introduced into cut or pricked flower stems of lavender gave positive results. Apparently the fungus, probably helped by enzyme action, produces the wilt very rapidly.

VAN BEYMA THOE KINGMA (F. H.) & VAN HELL (W. F.). **Ueber die Botrytiskrankheiten der Lilien.** [On the *Botrytis* diseases of Lilies.]—*Phytopath. Zeitschr.*, iii, 6, pp. 619–632, 6 figs., 1931.

The strain of *Botrytis elliptica* [*R.A.M.*, x, p. 667] isolated by van Beyma from *Lilium candidum* in Holland in 1928 forms no sclerotia [ibid., viii, p. 41], whereas a strain isolated by van Hell in 1930 from *L. umbellatum* produces these bodies and corresponds exactly with the species described by Wright in England in 1928 [ibid., viii, p. 106]. The results of inoculation experiments on lilies (*L. candidum* and different varieties of *L. umbellatum*) showed that van Hell's strain can destroy the plants entirely, while that originally isolated by van Beyma causes only slight injury. *B. hyacinthi* van Beyma [ibid., viii, p. 41], isolated from lily bulbs, also proved pathogenic in certain cases. Two strains of *B. cinerea* from lilies, one forming sclerotia, were found to be capable of producing leaf spots under favourable conditions. However, among these species of *Botrytis* the only virulent parasite is the sclerotium-forming strain of *B. elliptica*. In the absence of other morphological differences the production of sclerotia is not regarded as justifying the establishment of a new species.

NEWTON (W.) & HASTINGS (R. J.). **Botrytis tulipae (Lib.) Lind. I. The production of conidia as influenced by various factors.** —*Scient. Agric.*, xi, 12, pp. 820–824, 1931.

The results of cultural experiments with *Botrytis tulipae* [*R.A.M.*, x, p. 524] briefly described in this paper, indicated that among the factors that stimulate the production of conidia by this fungus the one most likely to be of practical importance under field conditions is low temperature; the spores were rarely produced above 25° C. This suggests the advisability of applying protective sprays to the foliage of tulips in early spring, particularly during cold spells. The disease is stated to be very prevalent in commercial bulb gardens of the coastal regions of British Columbia.

TAKIMOTO (S.). **Bacterial leaf spot of Iris.**—*Fungi (Nippon Fungological Soc.)*, i, 1, pp. 21–24, 1 fig., 1931. [Japanese, with English summary.]

Bacterium iridicola Takimoto n. sp., causing a brown leaf spot

on *Iris tectorum* and *I. japonica* in Fukuoka, Japan, is a short rod with rounded ends, occurring singly or in pairs, measuring 1·2 to 2 by 0·7 to 0·8 μ and forming white, circular, raised, or convex colonies on beef agar; motile by one to three polar flagella; Gram-negative, liquefying gelatine, clearing milk without coagulation or reduction of litmus, forming neither acid nor gas from sugars, digesting starch; optimum temperature for growth 38° C., minimum 4°, thermal death point 51°.

LAUBERT (R.). **Eine sehr schädliche Krankheit der Daphne mezereum L.** [A very injurious disease of *Daphne mezereum* L.]—*Blumen- und Pflanzenbau*, xlvi, 9, pp. 138–139, 2 figs., 1931.

Young plants of *Daphne mezereum* sent to the Biologische Reichsanstalt, Berlin, for inspection showed a brown spotting of the upper and under side of the leaves, especially on the narrow basal portion, which was frequently quite discoloured, soft, and wilted. The spots were covered with waxy spore masses composed of the hyaline, elongated-obovate, uniseptate, slightly curved conidia, 15 to 25 μ long, of *Marssonina daphnes* (Desm. et Rob.) Magn. The fungus has been reported (on this host only) from France, Holland, and Germany.

THORNBERRY (H. H.) & ANDERSON (H. W.). **A bacterial disease of Barberry caused by Phytomonas berberidis, n.sp.**—*Journ. Agric. Res.*, xliii, 1, pp. 29–36, 1 pl., 4 figs., 1931.

The authors investigated a bacterial disease (the chief symptom of which is a severe leaf spotting with some defoliation) which is prevalent on the Japanese barberry (*Berberis thunbergii*) in the northern United States, and was also observed on *B. amurensis* [var.] *japonica*, *B. brevipaniculata*, and *B. vulgaris* in Illinois. The rounded or slightly angular spots are 2 to 5 mm. in diameter, dark green and water soaked when young, but soon turning dark purple. The disease also attacks the petioles and succulent shoots, the young spots resembling those on the leaves, though on ageing they elongate and in some cases girdle the twigs, causing a distinct terminal blight. Infection in one-year-old twigs prevents the development of their buds in the spring, the tissues of the deeper bark layers near the buds containing small dark streaks which may attain one cm. or more in length but are usually much shorter, sometimes mere dots. The bacteria appear to live over winter in these lesions, causing renewal of infection in the spring.

The causal organism, which is named *Phytomonas berberidis* n. sp. [a technical description of which is appended] is a short, motile, aerobic, Gram-positive, non-acid-fast, capsule-forming but not sporulating rod, 1·5 to 2·5 by 0·5 to 1 μ in diameter, with two to four polar flagella. On dextrose agar it forms smooth, pulvinate, entire, white, opaque colonies. It has no diastatic action, and failed to ferment the sugars, alcohols, and glucosides which were tested. It does not coagulate or peptonize litmus milk, and does not reduce the litmus. No hydrogen sulphide or indol are produced. The optimum, minimum, and maximum P_H values for its growth are 8·5, 4·8, and 9·6, respectively, and the optimum,

minimum, and maximum temperatures 18°, 7°, and 30° C. with the thermal death point at 50°.

There was some evidence that infection in the field occurs through the stomata and slight wounds on the leaves.

THORNBERRY (H. H.) & ANDERSON (H. W.). **Bacterial leaf spot of Viburnum.**—*Phytopath.*, xxi, 9, pp. 907–912, 4 figs., 1931.

Viburnum opulus, *V. tomentosum*, and *V. dentatum* at Illinois University were observed in May, 1929, to be infected by a bacterium causing an irregular brown spotting of the leaves, accompanied by inconspicuous shrunken lesions on the stems. The causal organism, to which the name *Phytomonas viburni* n. sp. is given, was readily isolated from the diseased tissues. It measures 1 to 2 by 0·5 to 1 μ, occurs mostly in pairs but sometimes singly or in short chains, and is motile by means of 2 to 4 polar flagella. The organism is non-acid-fast, Gram-positive, forms pale grey colonies on dextrose beef-extract agar, does not liquefy gelatine, ferment sugars, or reduce nitrates; the optimum, minimum, and maximum P_H for growth are 8·5, 4·8, and 10·4, respectively, the corresponding temperatures being 25°, 12°, and 35° C. The pathogen overwinters in cankers, in infected buds, and possibly in diseased leaf débris in the soil. Artificial inoculations on *V. opulus* produced typical lesions, and the organism was reisolated in pure culture.

ZELLER (S. M.). **A witches' broom of Ocean Spray (Holodiscus discolor).**—*Phytopath.*, xxi, 9, pp. 923–925, 1 fig., 1931.

Ocean spray (*Holodiscus discolor*), a rosaceous shrub native to the Pacific Northwest, was observed in 1925 to be affected by a witches' broom at Corvallis, Oregon, and subsequently the disease was found in other parts of the State and in Thurston County, Washington. Among the symptoms are increased production of thin, wiry lateral shoots; shortening of the internodes of the new shoots arising from the collar, which show little tendency to branching so that blossom clusters are usually absent; and dwarfing, crowding, and bronzing of the leaves. Experiments showed that the witches' broom symptoms may be induced by the budding of diseased nodes into healthy stems and the transfer of *Aphis spireae* from infected to healthy plants. The disease is believed to belong to the virus group.

[NATTRASS (R. M.).] **The white root rot of fruit trees.**—*Cyprus Agric. Journ.*, xxvi, 3, pp. 77–80, 3 figs., 1931.

Popular notes are given on the symptoms, life-history, and control of root rot of fruit trees (*Rosellinia necatrix*) [*R.A.M.*, vi, p. 560; xi, p. 24], which in Cyprus is stated to be particularly destructive on nursery seedlings. Young trees can sometimes be saved, in cases of mild infection, by pruning off the diseased roots and replanting in healthy soil. Treatment of the soil with a mixture of lime and sulphur (half and half), carbon bisulphide, or copper sulphate may be effective in conjunction with cultural measures [which are briefly indicated].

McClintock (J. A.). **The relation of canker treatment to fireblight control.**—*Phytopath.*, xxi, 9, pp. 901–906, 3 figs., 1931.

Three bearing crab-apple trees of the Transcendent variety were treated with zinc chloride against fireblight (*Bacillus amylovorus*) [*R.A.M.*, vii, p. 791] in 1929 at the Tennessee Agricultural Experiment Station. The solution was used at the maximum strength of 53 per cent., the infected areas being painted for a distance of 8 to 12 inches beyond the external lesions. The application appeared to kill the organisms in the deep cankers involving the cambium as well as in the shallow ones. In the autumn of 1929 the three trees were free from untreated cankers, and in the following March they were enclosed in insect-proof cages. They then passed through the flowering period without developing blossom and twig blight, which was prevalent throughout eastern Tennessee. Twig blight was induced in one of the caged trees (a semi-dwarf) by placing a container full of diseased fruit spurs and young shoots on the screen covering the top of the case during a spell of wet weather in May. On 12th May, blighted blossom spurs and shoots from a Bartlett pear were placed on the case covering one of the Transcendent trees (a dwarf), two of the twigs of which developed infection following several rainy days.

These experiments are regarded as demonstrating the efficacy of the 53 per cent. zinc chloride solution in destroying the bacteria in hold-over cankers on apple trees, no appreciable injury to which resulted from the treatment.

Ogilvie (L.). **A fruit rot of Apples and Pears due to a variety of Phytophthora syringae.**—*Ann. Rept. Agric. & Hortic. Res. Stat., Long Ashton, Bristol, for 1930*, pp. 147–150, 2 pl., [1931].

During the autumn of 1929 a fruit rot of apples and pears somewhat resembling the brown rot due to *Monilia* [*Sclerotinia*] *fructigena* was very prevalent in the south-west of England. The affected apples showed light brown areas on the skin, rather like bruises, but not causing any flattening in the contour of the fruit. Inside, the affected part extended towards the core; it had brown striations marking the course of the vessels and was rather tough. On pears the affected areas were darker brown than on apple, with a well-defined edge, and the tissues were traversed by brown vascular striations.

From the affected parts a fungus was isolated which in culture on solid media formed sporangia of the *Phytophthora syringae* type but measuring (average of 17) 45·4 by 28·3 μ, the average measurements in water being 48·8 by 28·5 μ. The fungus is considered to be a stain of *P. syringae* distinct from the Irish strain of Lafferty and Pethybridge [*R.A.M.*, ii, p. 182].

From these facts, it appears that two *Phytophthora* fruit rots of apples and pears are prevalent in England, one caused by *P. cactorum* [ibid., ix, pp. 136, 392] the other due to this strain of *P. syringae*. The observations made at Long Ashton indicated that infection by *P. syringae* occurred largely from the soil and that sound fruits in contact with diseased ones readily became

infected after picking. The disease also developed in cold storage in about one month.

Control consists in preventing the fruit from coming into contact with the soil and frequently removing diseased fruit from the storage trays.

TURNER (H. A.) & DOWSON (W. J.). **The date and duration of the winter spore discharge of black spot.**—*Tasmanian Journ. of Agric.*, N.S., ii, 3, pp. 124–128, 1931.

Examination in the laboratory of a number of Cox's apple leaves, collected at random on 20th August, 1930, at Freshwater Point, Tasmania, showed that all bore immature perithecia of the black spot fungus (*Venturia inaequalis*). Five of these leaves, and two pear leaves with immature perithecia of *V. pirina*, were laid on the ground in the open at Launceston, with glass slides smeared with glycerine over them to catch the spores ejected from the perithecia after maturation. The first ascospores of *V. inaequalis* were caught on the 28th, after a heavy rain during the preceding night, and the first of *V. pirina* on the 9th September, showing that the latter had taken about ten days longer to mature than *V. inaequalis* under similar conditions. These observations are considered to indicate that, in the Tamar orchards, spores of *V. inaequalis* were present in the air by 27th August, and those of *V. pirina* by 8th September. The examination of the slides was continued until the leaves became disintegrated, and the results showed that while during dry periods no spores were discharged, after rain sufficiently heavy to drench the leaves, spores were emitted within a few hours. During the three months of the experiment, spore discharge occurred on sixteen separate occasions, starting before the dormant or green tip stage of the majority of apple varieties, and at the pink bud stage of most pear varieties, and continuing for at least three months.

These preliminary investigations show that everything possible should be done to bury the fallen leaves of apples and pears before the green tip stage; the ground should then be left without cultivation for as long as possible, i.e., until at least two control sprayings have taken place. The sprayings should be started early, not later than the green tip stage.

MARSH (R. W.). **Spraying trials against Apple and Pear scab at Long Ashton. III. Season 1930.**—*Ann. Rept. Agric. & Hortic. Res. Stat., Long Ashton, Bristol, for 1930*, pp. 151–161, [1931].

The continuation of experiments in the control of apple scab [*Venturia inaequalis*] at Long Ashton [cf. *R.A.M.*, ix, p. 724] for the third year in succession afforded striking evidence of the cumulative effect of spraying. Thus, although the weather was more favourable to scab infection than in either of the two years previously, a plot of 96 Lane's Prince Albert trees, although not sprayed at all in 1930, gave 95·3 per cent. clean fruit; a plot of Allingtons after one application of lime-sulphur (1 in 60) gave 98 per cent. scab-free fruit. This high degree of control is believed to result from the fact that the trees were almost freed from scab

in 1928 and were kept completely free in 1929. In consequence, no opportunity was afforded for wood infections during 1929 and the source of a spring outbreak was eliminated [ibid., xi, p. 49]. On a plot of Newtons and Grieves where scab had been allowed to develop in 1929, two pre-blossom sprays and one post-blossom resulted in completely clean crops in 1930. On pear varieties, one pre-blossom and one post-blossom (half-strength) application of Bordeaux mixture gave 98·5 per cent. clean fruit without causing injury.

The addition of aluminium sulphate to lime-sulphur did not obviate sulphur damage to Lane's Prince Albert apples, and on this variety all spraying against scab should be effected before blossoming. On Worcester Pearmain russeting followed a post-blossom spray with half-strength Bordeaux, and apples of this variety should therefore be given a pre-blossom spray of 1 in 60 lime-sulphur.

The use of spray guns with a power outfit reduced the time spent in spraying by 33 to 50 per cent., as compared with the time taken when lances were employed; the gun spraying caused no increase in spray damage.

The cost of the apple spraying was about the same as in 1929 and worked out at 1¼*d.* per tree for one application of lime-sulphur, while the combined cost of the two applications of Bordeaux mixture given to pears seven years planted amounted to about the same.

Bagenal (N. B.), Goodwin (W.), Salmon (E. S.), & Ware (W. M.). **The control of Apple scab. I. Bramley's Seedling.**—*Journ. South-Eastern Agric. Coll., Wye, Kent*, xxviii, pp. 188–195, 2 figs., 1 plan, 1931.

Tests conducted during 1924 and 1925 at Marden, Kent, in the control of scab [*Venturia inaequalis*] on Bramley's Seedling apples by applications of various sprays [cf. *R.A.M.*, ix, pp. 790, 791] gave the following results. In the former year the plot sprayed three times with home-made Bordeaux mixture (8–25–100) gave 69·6 per cent. (by weight) clean apples while in 1925 the corresponding figure was 68·5 per cent., these results representing an increased yield of clean fruit of 41 and 40·2 per cent., respectively, over the unsprayed controls, and of 20·7 and 10·7 per cent., respectively, over the plot sprayed three times with 1 in 30 lime-sulphur. The plot sprayed three times with Bordeaux mixture, compared with the plot sprayed twice, showed an increased percentage of clean fruit of 20·8 in 1924 and 15·2 in 1925. The plot sprayed three times with lime-sulphur as compared with the plot sprayed twice showed an increased percentage in 1925 of 23·8 clean fruit. No increased fungicidal power resulted in either year when lead arsenate was added to lime-sulphur, and no scorching of any commercial importance resulted from any of the treatments.

Goodwin (W.), Salmon (E. S.), & Ware (W. M.). **The control of Apple scab. II. Allington Pippin and Newton Wonder.**—*Journ.-South Eastern Agric. Coll., Wye, Kent*, xxviii, pp. 196–205, 2 figs., 1931.

In further spraying tests against apple scab [*Venturia inaequalis*:

see preceding extract] conducted in Kent in 1930, Allington Pippin apples sprayed three times with home-made Bordeaux mixture (8–12–100) gave only 15 per cent. scabbed apples. When the trees were sprayed at the pink bud stage with Bordeaux mixture and this was followed by two post-blossom applications of 1 in 60 lime-sulphur, 22 per cent. of the apples were scabbed. The corresponding figures for the three unsprayed control plots were 73, 76, and 76.

Newton Wonder trees after three applications of Bordeaux mixture gave 26 per cent. scabbed apples, while following an application of Bordeaux mixture at the pink bud stage and one post-blossom application of 1 in 60 lime-sulphur they yielded 81 per cent. scabbed fruit, the corresponding figures for three unsprayed control plots being 88, 85, and 91.

The application of 1 in 60 lime-sulphur immediately after petal fall caused serious defoliation on the Newton Wonder trees but resulted in little damage to the Allington Pippins. Two post-blossom applications of lime-sulphur after a pre-blossom application of Bordeaux mixture gave no better finish to Allington Pippin apples than did three applications of Bordeaux mixture. No russeting of commercial importance was produced by the Bordeaux mixture on Allington Pippin and none at all on Newton Wonder.

Birmingham (W. A.). **Black spot or scab of Apple. Experiments for its control in New South Wales.**—*Agric. Gaz. New South Wales*, xlii, 8, pp. 635–640, 5 figs., 1931.

After giving a brief account of the considerable economic importance of apple black spot or scab (*Venturia inaequalis*) in New South Wales, the author gives a summary description of the symptoms and an outline of the life-history of the causal fungus, and also formulates a control schedule applicable to the local conditions in that State.

[Dowson (W. J.)]. **Apple leaf-spot.**—*Tasmanian Journ. of Agric.*, N.S., ii, 2, pp. 79–80, 1931.

The author states that of recent years certain apple varieties (e.g., Cox's Orange Pippin, Jonathan, Scarlets, and Sturmer Pippin) in Tasmania have been observed to be liable to a leaf spotting which may appear early or late in the season; the spots are of various tinges of grey, brown, and purplish, and may be circular, rounded, or irregular. Some are found in the middle of the leaves, while others are confined to the edge and tips, and in Sturmers, besides spotting of the surface, the leaf margins darken to purple or bronze and curl upwards. The grey spots are due to *Phyllosticta pirina* [*R.A.M.*, ix, p. 487], and some of the rounded brown spots are caused by *Sphaeropsis malorum* [*Physalospora cydoniae*: ibid., ix, p. 41], but it is pointed out that both fungi are commonly found growing on leaves injured by sprays or on trees in a bad condition of health. The results of one year's investigation of the trouble indicate that it is not due to any one single cause, but to a combination of factors, among which potash deficiency [ibid., xi, p. 56] appears to play a predominant part, since in orchards where potash fertilizers are used regularly and in sufficient quantity, the

spotting is practically unknown. Another important factor is the scorching effect on the foliage of certain sprays. The preliminary preventive measures recommended are that Bordeaux mixture should only be used as a dormant spray (at the 'green tip' stage), and that lime-sulphur and arsenate of lead should not be applied during hot, sunny weather, nor as a mixed spray; and finally the affected trees should be tested for potash deficiency by applications of sulphate of potash at the rate of 3 cwt. per acre.

[Dowson (W. J.)]. **A note on the wood infection of Pear by black spot.**—*Tasmanian Journ. of Agric.*, N.S., ii, 3, p. 128, 1931.

The author states that a striking difference in Tasmania between the black spot [scab] of apple [*Venturia inaequalis*] and of pear (*V. pirina*) is that the latter organism frequently attacks the current season's wood of the pear trees, causing infections of the leaves and fruit during late summer. The spots on the wood form small black blisters, about one-eighth inch in diameter, either scattered along the shoot or massed together at its base. On older wood the blisters expand into small, roughened, black cankers. Emphasis is laid on the importance of this source of infection at a time when sprayings are practically over; the best protection against it is a careful pruning out of all current year's growth bearing the blisters, even at the cost of sacrificing some fruit wood.

Cooley (J. S. & Crenshaw (J. H.). **Control of Botrytis rot of Pears with chemically treated wrappers.**—*U.S. Dept. of Agric. Circ.* 177, 9 pp., 5 figs., 1931.

A species of *Botrytis*, probably *B. cinerea*, causes a serious storage rot of apples and pears in the Pacific Northwest, infection spreading through ordinary wrappers to sound fruits in contact with decaying ones. The spread of the rot has been controlled on Winter Nelis, Easter Beurre, and Anjou pears by the use of wrappers impregnated with a 2·5 per cent. solution of copper sulphate, the dry wrapper carrying about 1·4 per cent. of its dry weight in metallic copper in the form of copper sulphate. Preliminary experiments further indicate that the decay may be effectively controlled by the use of oiled paper wrappers impregnated with copper sulphate. No significant injury to the fruit was caused by this treatment in 30,000 boxes of the 1930 crop of Anjou pears [cf. *R.A.M.*, xi, p. 57].

Dippenaar (B. J.). **Anthracnose disease of Almonds.**—*Farming in South Africa*, vi, 64, pp. 133–134, 3 figs., 1931.

Almond trees in South Africa are liable to infection by *Gloeosporium amygdalinum* [*R.A.M.*, vi, p. 422], which chiefly attacks the fruit but also occurs on the twigs, shoots, leaves, and even on the flower-petals under moist conditions. The fungus forms yellowish-brown, sunken spots, 1 to 1·5 cm. in diameter; rotting of the kernel follows penetration, which may also be accompanied, in severe cases, by exudation of gum and mummification of the fruit. On half- to full-grown fruit the minute, brown specks produced by the fungus are partially hidden by hairs. Another feature of the anthracnose disease is the defoliation of young twigs

(up to one year old). Leaf infection (for which a large amount of moisture is necessary) is characterized by the development of water soaked areas at the tips and margins and bleaching of the tissues; all the leaves from a single bud may be killed. The Paper Shell and I.X.L. varieties show greater resistance than Jordan and Nonpareil. Some benefit was derived in 1930 from spraying with Bordeaux mixture or lime-sulphur on 31st July and 10th September, but two further applications are recommended to ensure complete control.

ILLINGWORTH (J. F.). **Yellow spot of Pineapples in Hawaii.**—*Phytopath.*, xxi, 9, pp. 865–880, 7 figs., 2 diags., 1 graph, 1931.

The initial symptom of yellow spot of young pineapples [*R.A.M.*, xi, p. 78], which has occurred in a destructive form in Hawaii since 1926, is a slightly raised, yellowish spot, $\frac{1}{8}$ to $\frac{1}{2}$ inch in diameter, on the upper surface of the leaf. At maturity the darker centre is surrounded by a yellow halo. The available evidence indicates that insect infection takes place near the centre of the plant, since the initial spots develop on the leaves of the third or fourth whorl from the centre. Under conditions favouring the disease, a yellow streak develops immediately below the initial spot, widening in the region of the white tissue at the leaf base. This streak tends to become constricted into circular yellow blotches, giving it the appearance of a chain of beads. The portion of the streak in the white tissue at the leaf base soon assumes a water soaked aspect, and when moisture is present in the leaf axils decay rapidly extends to the stem. A few days later the typical bead-like chain may be observed extending up the leaf next above the one first affected, and usually the remaining central leaves also become involved. Stem growth ceases at the point where the tissue is infected, and the normal development of the healthy part on the opposite side soon causes a decided bending over of the plant, a symptom that suggested the name of 'side rot' for the disturbance.

Humidity was found to be a most important factor in the acceleration of the disease, which may be retarded for months by drought. In 1929 the suggestion was first made that yellow spot might be a virus disease with some weed as a host, and the first evidence of transmission in cages was obtained when mosaic-diseased plants of *Crotalaria* were introduced, for about a month later typical yellow spot developed on the caged pineapples. *Thrips tabaci* was strongly suspected as the vector when the author ceased work and he states in a footnote that M. B. Linford subsequently finally established that this insect transmits the disease [ibid., x, p. 474].

PASSALACQUA (T.). **Una epidemia di 'brusone' del Nespolo del Giappone ('Eriobotrya japonica' Lindl.) dovuta al 'Bacillus amylovorus' (Burrill) Trevisan.** [An epidemic of blight of the Loquat (*Eriobotrya japonica* Lindl.) due to *Bacillus amylovorus* (Burrill) Trevisan.]—*Riv. Pat. Veg.*, xxi, 5–6, pp. 157–160, 1931.

In February, 1931, the author received from the vicinity of

Palermo, where the disease, known for some years, had then reached epidemic proportions and was causing heavy losses to growers, branches and fruits of loquat trees (*Eriobotrya japonica*) affected with fireblight (*Bacillus amylovorus*) [*R.A.M.*, iii, p. 380; vi, p. 175]. The condition rather resembled that commonly caused on pears by the same organism, the fruits developing with difficulty and showing a sort of rachitis.

Blackish spots were present on the fruit, both internally and in the vicinity of the remains of the calyx, suggesting that the disease had been present in the flowers. Later, the spots spread over the entire pericarp, causing the development of suberized areas. The pulp shrivelled and the fruit became mummified. The peduncles and the secondary and primary axes of the inflorescences withered, while the apical parts of the twigs were blackened and undeveloped. The leaves appeared to be unaffected.

The affected cells contained numerous bacteria. Infection penetrated to the seed coat but the reserve tissues were not attacked. The tissues adjoining the remains of the calyx were completely necrosed. In the inflorescence stalks the disease had reached the cambium but the xylem was unaffected. From diseased parts the author isolated *B. amylovorus*, the dimensions of which he gives as 1 to 1·5 by 0·8 to 1 μ, optimum temperature 28 to 30° C., thermal death point 50 to 55°.

Attempts to reproduce the disease on loquats in the Botanic Garden at Palermo gave negative results, probably owing to unsatisfactory experimental conditions.

GRAM (E.), CHRISTENSEN (A.), GREVE (M.), & POULSEN (A.). **Maskiner til Bejdsning af Korn og Frø.** [Machines for grain and seed disinfection.]—*Statens Redskabsprøver Beretning* 63, pp. 16–33, 3 figs., 1 diag., 1931.

The continuously working seed disinfection apparatus 'Germator', manufactured by the M.I.A.G., Mühlenbau u. Industrie A.G. Werke, Brunswick (Danish agent, E. Olsen, Jagtvej 179, Copenhagen Str.), is stated to have given excellent results in tests of beet seed treatment with dahmit [*R.A.M.*, x, p. 90] carried out in Denmark during 1930–1 and to be superior to any other machine of a similar type on the Danish market. The machine, which costs Kr. 975, is constructed for the short disinfection process [ibid., x, p. 445].

Satisfactory results were also given by the 'Triumph' apparatus, manufactured by P. Lübke, Breslau (Danish agents, P. F. Røhde and Søn, Roskilde, price Kr. 650), in the treatment of beet seed and barley seed-grain with germisan.

PUNTONI (V.). **Infestation des cultures de champignons par des acariens du genre Tarsonemus. Préservation de ces cultures.** [Infestation of cultures of fungi by acarids of the genus *Tarsonemus*. Preservation of such cultures.]—*Ann. de Parasitol. Humaine et Comp.*, ix, 4, pp. 359–362, 1 fig., 1931.

The fact that over 25 per cent. of some 70 cultures of various fungi which were sent in 1930 to the Bacteriological Laboratory

of the University of Rome were found to be heavily infested by a mite provisionally considered to be a variety of *Tarsonemus floricolus*, led the author to investigate the possibility of ridding such cultures of this pest and of preventing the spread of the latter to further cultures. The first aim was successfully attained by impregnating the cotton wool plugs of the culture tubes with xylol or, preferably, because of its less offensive smell, with rectified benzene, which by its vapours killed the mites in five or six minutes without any injury to the cultures. The spread of the pest to fresh culture tubes, in spite of its abundant presence in the laboratory, was prevented by soaking the ordinary cotton wool plugs in petroleum, pressing out with the hand, and leaving to dry in the air until apparent desiccation before use; the faint traces of petroleum remaining in the cotton wool were sufficient to prevent the mite from passing through it to 200 cultures thus treated, while 14 control tubes, kept under the same conditions, were all infected.

DICKINSON (S.). **Experiments on the physiology and genetics of the smut fungi. Cultural characters. Part II. The effect of certain external conditions on their segregation.**—*Proc. Roy. Soc. London*, Ser. B, cviii, B. 758, pp. 395–423, 1931.

In continuation of his study of the segregation of cultural characters in *Ustilago kolleri* [*R.A.M.*, viii, p. 298], the author describes and discusses in detail experiments to establish the influence of external factors on this process. Using the same technique as in his previous work, he demonstrated the presence in this organism of seven pairs of independent characters, two of which (gender and size of colony margin) are always segregated in the promycelium of the germinating chlamydospores in a 2 : 2 ratio, one (colour of the colony) is segregated at times in 2 : 1 : 1 and 4 : 0 ratios, and one (type of colony centre) is variously segregated in 2 : 1 : 1, 1 : 2 : 1, 3 : 1, and 4 : 0 ratios. He considers the character pairs gender and margin size to be each the expression of one pair of Mendelian factors, colour as the expression of two additive linked pairs, and type of colony centre as the expression of a number of pairs.

There was evidence that the linkage between the two colour factor pairs may be altered by changes in the concentration in the culture medium of the source of nitrogen, which also altered the percentage number of times four of the seven pairs of characters are segregated in a particular nuclear division, but had no effect on the haphazard distribution of the members of all seven pairs of segregating characters. On general lines the effect of increasing the concentration of the nitrogen source was to extend the process of segregation from one to two or three nuclear divisions, although segregation may occur in two non-consecutive divisions. The percentage segregation of gender is altered by four other external factors, namely, concentration of the medium, concentration of the carbohydrate source, hydrogen-ion concentration, and temperature; these factors, however, do not alter the haphazard segregation of gender.

The results of the investigation are considered to show that the

beginning and duration of the process of meiosis, as measured in nuclear divisions, is in part controlled by the external environment of the cell.

COONS (G. H.) & STRONG (M[IRIAM] C.). **The diagnosis of species of Fusarium by use of growth-inhibiting substances in the culture medium.**—*Michigan Agric. Exper. Stat. Tech. Bull.* 115, 7 pl., 1931.

Continuing their investigations on laboratory methods for the diagnosis of species of *Fusarium* [*R.A.M.*, viii, p. 520], the authors tested the reaction of 54 species and varieties to certain aniline dyes, of which the triphenylmethane group proved most useful, while acriflavine and copper sulphate were also promising. A key is given to the species, based on their responses to the dyes, the data relating to which are shown in 18 tables.

It would appear, from a consideration of these readings, that the broad limits indicated by the main divisions and major subdivisions in the keys denote the reaction to be expected from an organism which a specialist in the diagnosis of *Fusarium* would assign to the species indicated. For instance, true *F. eumartii* or *F. cubense* cultures may be expected to show extreme sensitiveness to malachite green and crystal violet, while *F. niveum*, *F. lycopersici*, and *F. vasinfectum* occupy an intermediate position, in respect of their response to malachite green, between the above-named highly sensitive organisms and the moderately sensitive *F. oxysporum*. *F. solani* and its allies, on the other hand, are readily distinguishable from the foregoing by their tolerance of malachite green and crystal violet, whereas a differentiation on morphological grounds is very difficult. Many repetitions of the tests over a period of several years indicated that approximately identical results were obtained each time.

RAISTRICK (H.), BIRKINSHAW (J. H.), CHARLES (J. H. V.), CLUTTERBUCK (P. W.), COYNE (F. P.), HETHERINGTON (A. C.), LILLY (C. H.), RINTOUL (M. L.), RINTOUL (W.), ROBINSON (R.), STOYLE (J. A. R.), THOM (C.), & YOUNG (W.). **Studies in the biochemistry of micro-organisms.**—*Phil. Trans. Roy. Soc. London*, Ser. B, ccxx, pp. 1–367, 3 diags., 1931.

A comprehensive and fully tabulated account is given of the studies conducted by the authors in the biochemistry of micro-organisms. The following are among the aspects under which the subject was considered: (1) quantitative methods and technique of investigation of the metabolic products of micro-organisms; (2) quantitative examination by the carbon balance sheet method [the application of which is fully described] of the types of products formed from glucose by species of *Aspergillus*, *Penicillium* (including *Citromyces*), *Fusarium*, and miscellaneous species of fungi; (3) production of mannitol from glucose by species of *Aspergillus*; (4) production of citromycetin and citrinin, new yellow colouring matters, from glucose by species of Wehmer's *Citromyces* group and *P. citrinum* Thom, respectively; (5) production of a new methoxy-dihydroxy-toluquinone from glucose by

species of *Penicillium* of the *P. spinulosum* series; (6) production from glucose by *P. spiculisporum* Lehman of a new polybasic fatty acid, $C_{17}H_{28}O_6$; (7) products of glucose metabolism formed by various species of fungi; (8) biochemical characters of *P. digitatum* and *P. italicum*, responsible for the rot of citrus fruits [see above, p. 104].

P. digitatum is stated to be unique among the species investigated in the fact that it produces from glucose considerable amounts of ethyl acetate. It further produces ethyl alcohol and a new polysaccharide giving rise to glucose on hydrolysis. *P. italicum* forms from glucose a new metabolic product characterized by its colour reactions with ferric chloride and bleaching powder which are diagnostic for the species.

NEUWEILER (E.). **Kartoffelanbauversuche der Vereinigung Schweizerischer Versuchs- und Vermittlungsstellen für Saatkartoffeln. Dritte Mitteilung der eidgenössichen landwirtschaftlichen Versuchsanstalt Oerlikon.** [Potato cultivation experiments of the Association of Swiss Experiment Stations and Agencies for Seed Potatoes. Third communication of the Federal Agricultural Experiment Station Oerlikon.] —*Landw. Jahrb. der Schweiz*, xlv, 4, pp. 513–538, 1931.

In experiments in various parts of Switzerland in 1929 and 1930 (16 in each year) it was observed that the incidence of virus diseases (leaf roll and mosaic) was higher on heavy soils. Among the early varieties the percentage increased from 19 in the former to 32 in the latter year, among the medium-early from 28 to 30, and among the late from 6 to 25 per cent. A distinct correlation was detected between the prevalence of virus diseases and decline of yield in the early varieties Goldball and Lichtblick, the medium-early King George V and Sonnenragis, and the late Feuerragis, Wekaragis, and Fulda.

Notes are given on the reaction to wart disease [*Synchytrium endobioticum*: *R.A.M.*, viii, p. 123; x, p. 544] of the varieties used in the tests.

The 'practical' tests in 1929 (41) and 1930 (37) were conducted with varieties that had given satisfactory results as regards yield in the above-mentioned trials. There was again a high incidence of virus diseases in the early varieties, Kuckuck and Eerstelingen [Duke of York] and the medium-early Alma, the percentages increasing from 11, 0·5, and 16·7, respectively, in 1929 to 42, 31, and 62, respectively, in 1930. Even among the later varieties there was an increased incidence of virus diseases in 1930 (4 to 12 compared with 0·6 to 5 per cent. in 1929).

In a series of tests conducted from 1928 to 1930 to determine the suitability of certain varieties for cultivation in mountainous regions, it was found that severe virus infections occurred in all those used at Villa-Vedretto, Ticino (1,380 m. above sea level), the amounts reaching 75, 70, 40, and 45 per cent., respectively, in Alma, Heimat (Böhm), Industrie, and Centifolia (v. Kameke) in 1930. Generally speaking, however, the two last-named varieties are well adapted for cultivation at high altitudes.

VERPLANCKE (G.). **Les maladies de dégénérescence de la Pomme de terre.** [Degeneration diseases of the Potato.]—*Journ. Soc. Centr. d'Agric. de Belgique*, xi, 6, pp. 138–167, 1931.

After briefly indicating the symptoms shown by the chief forms of degeneration diseases of the potato, the author discusses the various theories held by different authorities as to the origin of these conditions and indicates the effects exercised upon them by such environmental factors as soil, prevailing temperature, date of planting, altitude, and varietal resistance. A brief indication is given of the prevalence and severity of mild, rugose, and aucuba mosaic, leaf roll, streak, and mottling in the different potato-growing areas in Belgium, and the paper concludes with a discussion of the possibility of organizing local centres of seed selection.

BREHMER [W. v.] & ROCHLIN (EMILIA). **Histologische und mikrochemische Untersuchungen über pathologische Gewebeveränderungen viruskranker Kartoffelstauden.** [Histological and microchemical investigations on pathological tissue changes in virus-diseased Potato plants.]—*Phytopath. Zeitschr.*, iii, 5, pp. 471–498, 6 figs., 1931.

The writers' joint investigations at the anatomical laboratory of the Biologische Reichsanstalt, Berlin, are stated to have been undertaken mainly to determine the applicability of the methods used by the first-named in the differentiation of phloem necrosis, phloem necrobiosis, and obliteration of the phloem of leaf roll potato plants to the pathological changes observed by the junior author in those affected by mosaic and other virus diseases [*R.A.M.*, x, p. 264].

It was found that all potato plants, whether healthy or diseased, are liable to necrobiotic modifications. At first the necrobiotic sieve-tubes remain alive notwithstanding the swelling of the walls, but they die when this process involves the occlusion of the lumen. Pronounced necrobiotic swelling of the walls may be induced by abnormal environmental conditions. The symptoms, for instance, of nutritional disturbance in potato plants may resemble more or less closely those of virus diseases.

On the other hand, necrotic tissue changes are peculiar to virus-diseased plants, for the anatomical recognition of which they serve as diagnostic characters. Such alterations, which may occur in other parenchymatous tissues besides the phloem, are totally independent of vegetative influences and other external conditions. They cannot be induced either by drought or moisture, abundance or deficiency of manure, or by different kinds of soil. The necrosed cells, especially sieve-tubes and companion cells, collapse and those surrounding them are stretched to a corresponding extent. This stretching of the cells does not occur in necrobiosis. Accompanying the necrotic disorganization are the typical characters of the virus diseases, e.g., leaf rolling and curling, cauliflower-like distortions, and so forth. The necrotic tissue alterations are produced by organisms that destroy the cell contents and cause the death of the cell or cell complexes [ibid., ix, p. 799]. The pathological manifestations arising from this type of necrosis are irreversible.

Yellow discolorations develop in the necrotic tissue which are attributable, not to lignin deposits (lignification) but to the infiltration of fatty acids (suberization). Reliable indicators for necrotic tissue are Millon's reagent, Mäule's reaction, alcoholic phloroglucin solution, and extinction in polarized light, in which the walls of necrobiosed cells and ordinary cellulose membranes are strongly illuminated.

Obliterations of the phloem and cortical parenchyma are typical manifestations of senility in no way connected with virus diseases, necrosis, or leaf rolling induced by nutritional disturbances in the plant.

The cell contents of the necrotic tissues were found to be more acid than those of the adjacent healthy ones.

OLDAKER (C. E. W.). **Potatoes. Virus diseases and seed selection.**—*Tasmanian Journ. of Agric.*, N.S., ii, 2, pp. 91–92, 1931.

As exemplifying the good results of the educational campaign of the Tasmanian Department of Agriculture for the elimination from that island of potato virus diseases [*R.A.M.*, ix, p. 332], the author cites the case of two potato growers, one of whom succeeded by a drastic removal from his crop of about 50 per cent. of undesirable plants in producing the next year a crop showing a probable maximum of 15 per cent. of unsatisfactory plants, as against nearly 100 per cent. produced by seed tubers drawn from a district known to be capable of supplying good strains. The other grower, by strict selection of the mother plants, has succeeded in producing two small plots of 'Medium-top Brownell' and 'Big-top', in which there is no trace whatever of virus disease and all the plants are uniform in size and appearance.

ROBERTSON (I. M.) & SMITH (A. M.). **A study of the hydrogen-ion concentration of the Potato tuber.**—*Biochem. Journ.*, xxv, 3, pp. 763–769, 1931.

The following values were obtained in a comparative investigation of the hydrogen-ion concentration of healthy and diseased potato tubers: corky scab (*Spongospora subterranea*) on Great Scot, normal tuber P_H 5·70, diseased areas 4·35; common scab (*Actinomyces scabies*) on Duke of York, P_H 5·75 and 4·58, respectively; sprain (*Bacterium rubefaciens*) [*R.A.M.*, viii, p. 594] on Epicure, P_H 5·73 and 5·60; blackleg (*Bacillus atrosepticus*) [*B. phytophthorus*] on Epicure, P_H 5·73 and 5·65; blight (*Phytophthora infestans*) on Duke of York, P_H 5·75 and 5·83 (for fresh lesions) or 5·38 (for old ones); wart (*Synchytrium endobioticum*) on Duke of York, P_H 5·75 and 5·02; mosaic, crinkle, and leaf roll on Ally, healthy tubers, P_H 5·80, diseased 5·70, 5·60, and 5·85, respectively; mosaic and leaf roll on Arran Comrade, healthy tubers, P_H 5·64, diseased 5·47 and 5·70, respectively.

WAGER (V. A.). **Bacterial wilt of Potatoes.**—*Farming in South Africa*, vi, 62, pp. 63–64, 3 figs., 1931.

Bacterial wilt of potatoes (*Bacterium solanacearum*) is stated to be common in most parts of South Africa. Only a few cases of

this disease [the symptoms of which are briefly described] have been found on tobacco in South Africa, but it occurs in a severe form on tomato and causes wilting of groundnuts, eggplants, and pepper [*Capsicum annuum*]; some common weeds, e.g., *Datura stramonium* and *Physalis minima* are also susceptible. The best growth of the organism occurs at about 95° F. The primary source of infection by bacterial wilt in South African potatoes appears to be the use of diseased seed-tubers. In infested soil the organisms enter the plants through the roots, especially if these are injured in transplanting (tomatoes), or by the attacks of cutworms and eelworms. Infection is further disseminated by leaf-eating insects feeding first on diseased and then on healthy plants. Another dangerous source of infection is irrigation water. Preventive measures are concisely indicated.

WAGER (V. A.). **Common scab of Potatoes.**—*Farming in South Africa*, vi, 61, pp. 21–22, 2 figs., 1931.

A brief, popular account is given of potato scab (*Actinomyces scabies*), a disease of common occurrence in South Africa, with directions for its control.

VERPLANCKE (G.). **Étude cytologique des verrues de la Pomme de terre attaquée par le Synchytrium endobioticum Schilb.** [Cytological study of the warts of potatoes attacked by *Synchytrium endobioticum* Schilb.]—*Comptes rendus Congrès National des Sciences 1930*, Bruxelles, pp. 671–675, 11 figs., [? 1931].

The author states that the comparative cytological study of normal tissue from potato tubers (Industrie de Pologne variety) and of diseased tissue from tubers affected with wart disease (*Synchytrium endobioticum*) showed the presence of the following abnormalities in the cells of the latter. Some giant cells in the warts were found to be in a state of triploid and tetraploid division (polyploidy), with considerably larger nuclei, but with normally shaped chromosomes. Other cells were plurinuclear, and finally, the liquid in the cell vacuome forms a distinct black precipitate under the action of osmic acid which has no effect on the vacuome of normal cells.

WILTSHIRE (S. P.). **The correlation of weather conditions with outbreaks of Potato blight.**—*Quart. Journ. Roy. Meteorol. Soc.*, lvii, 240, pp. 304–316, 1931.

After a brief survey of the work of Dutch investigators on the correlation between weather conditions and outbreaks of potato blight (*Phytophthora infestans*), resulting in the organization of a spray-warning service [see above, p. 96], the author discusses the applicability of the data obtained in Holland to English conditions.

An examination of 26 outbreaks of late blight in England and Wales in the light of tabulated data supplied by the Meteorological Office showed that van Everdingen's four conditions [ibid., v, p. 627] were completely fulfilled during the preceding fortnight in 18 cases. In one case they were almost entirely fulfilled during

the preceding fortnight and completely within the preceding 23 days, while in the remaining seven the requirements were almost exactly satisfied during the preceding fortnight. With one exception, the outbreaks before which the conditions were almost, but not quite, fulfilled show protracted dew formation (7 to 17 hours), this being probably the most important factor, from the phytopathological standpoint, among those measured. It would appear from these results that van Everdingen's four conditions prevail more or less exactly in the great majority of English cases. It was necessary, however, to determine the frequency of such conditions without the resultant development of potato blight. For this purpose an analysis was made of the weather records from 15th April to within 16 days of the outbreak for eight outbreaks following completely favourable days.

The outcome of this examination indicates that in England a number of favourable days occur which are not followed within 15 days by blight epidemics, though the latter often take place within 30 days, and further, that a few favourable days occur irregularly even earlier. In van Everdingen's data a few exactly or almost exactly favourable days were not followed by outbreaks of blight within a fortnight. If no deviation from the Dutch requirements be permitted, then only 18 out of 26 British records completely satisfy the conditions, as compared with van Everdingen's 29 out of 30. Allowing 10 per cent. deviation in one factor alone, all the British outbreaks except three are preceded by almost favourable days within the fortnight before an outbreak, but at the same time the number of the almost favourable days not followed by blight outbreaks is greatly increased.

Attention is drawn to the necessity of close phenological studies for the further elucidation of the potato blight problem. In the writer's opinion, research in this subject is more likely to be promoted by an intensive study of the fungus under field conditions than by an exhaustive statistical examination of the relation of outbreaks to weather records.

TAUBENHAUS (J. J.) & EZEKIEL (W. N.). **Late-blight of Tomatoes and Potatoes.**—*Texas Agric. Exper. Stat. Circ.* 60, 4 figs., 1 map, 1931.

A popular account is given of the symptoms of late blight (*Phytophthora infestans*) on potatoes and tomatoes [*R.A.M.*, vi, p. 583], with notes on the damage caused by an epidemic of the fungus in south Texas in 1931. In Cameron County the final loss in the potato crop was estimated at 30 per cent., while the reduction from late blight in tomatoes ranged from 50 to 100 per cent., with an average of at least 50 per cent. The epidemic is believed to have originated in seed or table potatoes brought into the Rio Grande Valley from northern States. It was experimentally shown that apparently sound tomato fruits from infested fields may already be infected and may develop blight after packing and shipping [ibid., xi, p. 78]. It was found possible to eliminate two-thirds or more of this delayed decay by culling four days after packing.

The Texas epidemic occurred in the early spring, instead of in

the late autumn, as is usual in more northerly regions. During February the weather conditions were almost ideal for the development of the fungus, the average temperature being only 63·7° F., while rain fell on seven days and only three days were free from cloud [see preceding abstract]. The temperature continued low during March. In April, when the tomato crops were attacked, conditions again favoured the spread of *P. infestans*, the average temperature being only 67·6°, with rain on nine days, more or less cloud on 24 days, and heavy dews every night.

Good control of the blight was obtained by the use of copper-lime dust (20 lb. powdered copper sulphate, 10 lb. calcium arsenate, and 70 lb. hydrated lime), at the rate of 20 to 40 lb. per acre. Spraying with 4–4–50 Bordeaux mixture, however, is recommended as more generally effective than dusting.

WAGER (V. A.). **Early blight of Potatoes.**—*Farming in South Africa*, vi, 64, pp. 147–148, 3 figs., 1931.

Popular notes are given on the occurrence of early blight of potatoes (*Macrosporium* [*Alternaria*] *solani*) in South Africa and its control by spraying with Bordeaux mixture 4–4–50. Five applications of the fungicide have been found to give as good results as eight, the yield being increased by 8 to 50 per cent. Satisfactory control of *A. solani* has also been obtained by dusting with Bordeaux or copper-lime dust, of which 4 to 5 lb. per acre should be used with the American Beauty duster. The cost of this treatment at 10 lb. per acre, which allows for wastage, is estimated at about £1 5*s*. 0*d*.

WAGER (V. A.). **The Rhizoctonia disease of Potatoes.**—*Farming in South Africa*, vi, 63, pp. 97–98, 1 fig., 1931.

Heavy damage is caused in all parts of South Africa by *Rhizoctonia solani* (*Corticium vagum*) [*C. solani*], not only on potatoes but also on more than 75 other species of plants. Carnations, for instance, suffer very severely from the attacks of this fungus, which causes the wilting and death of the plants and rotting of the stem base. In recent experiments with two strains of *C. solani* the writer found that neither grew at 95° F. and only one at 41°, the optimum temperature for the development of one of the strains being 86° and for the other 77°. Popular notes are given on the symptoms of the disease and its control.

DASTUR (J. F.). **Potato storage in the Central Provinces.**—*Agric. & Live-stock in India*, i, 4, pp. 374–381, 2 pl., 1931.

During the seven or eight months elapsing between the time when potato tubers in the northern districts of the Central Provinces are placed in storage to provide seed for the 'rabi' (winter) crop and their removal for planting, two entirely different sets of climatic conditions, hot weather and monsoon, have to be considered in relation to storage methods. Soon after harvesting in February or March, the day temperature begins to rise until a maximum of above 100° F. (115° in some parts) is reached, while at the same time there is a marked drop in the atmospheric humidity. During

the summer months, therefore, potatoes must be protected against the effects of excessively high temperatures and low atmospheric humidity; at the onset of the monsoon, however, it is necessary to counteract the influence of high humidity, the temperature becoming more moderate.

The chief cause of the heavy loss among potato tubers in the hot summer months is 'heat rot' or 'black heart' [*R.A.M.*, v, p. 626]. Affected tubers show a black discoloration of the heart due to local changes caused by the death of certain cells; this may spread until the whole tuber is involved. The affected parts are reduced to a pulp and the tuber emits an offensive odour, while drops of a dirty-coloured fluid are exuded from the skin, especially from the 'eyes'.

The chief cause of loss during the high humidity season of the monsoon is the premature sprouting of the tubers.

Other diseases causing severe damage to stored tubers are wet and dry rots (*Fusarium* sp., *Rhizoctonia bataticola* [*Macrophomina phaseoli*: ibid., x, p. 437], and bacteria).

Full details are given of a method of storing potatoes during the hot weather in pits, 24 to 30 inches deep, lined and covered with dry leaves and ventilated by hollow bamboo stems, surrounded by a trench, 6 inches deep by 4 inches wide, which has given satisfactory results during the last four or five years. When kept in ordinary rooms, even if on racks or covered with sand, the losses have been extremely heavy. Pit storage in the areas of heavy monsoon rains is only suitable for seed intended for sowing the monsoon crop. For the winter crop the best results have been obtained by pit storage in dry areas. No benefit was derived from the treatment of the tubers with formalin, mercuric chloride, or uspulun, careful selection being sufficient to ensure good keeping properties.

MURRAY (R. K. S.). **Further sulphur dusting experiments against Oidium.**—*Trop. Agriculturist*, lxxvii, 2, pp. 112–119, 2 pl., 1931.

The author states that sulphur dusting experiments [some details of which are given] in 1930–1 on the same fields of the Kandanuwara Estate, Ceylon, as in 1929–30 [*R.A.M.*, ix, p. 804] for the control of rubber mildew (*Oidium*) [*heveae*] fully confirmed the conclusions previously formed as to the efficacy of the treatment [cf. also ibid., x, p. 486]. The measure of control attained in that season was even greater than in previous experiments, it is believed mainly because the operations were started earlier, a fact which emphasizes the necessity of keeping a careful watch for the first sign of mildew activity, when the first dusting should be immediately made. A computation of the expense involved in the treatment indicates that, even disregarding the increase in yield of rubber, the sulphur dusting can be safely recomtnended in severely infected areas for the sake of improving the general health of the trees, as no manurial or other treatment has ever effected so marked an improvement as that brought about by the dusting during two consecutive seasons. The control field, on the other hand, is in a very poor condition; the bark renewal in it is almost

negligible, the yield shows a considerable decrease, and the trees appear to be doomed to a more or less early death.

BRANDENBURG (E.). **Die sogen. Urbarmachungskrankheit bei Futterrüben und Erbsen.** [The so-called reclamation disease of fodder Beets and Peas.]—*Angew. Bot.*, xiii, 5, pp. 456–459, 1931.

The results of the writer's recent investigations in Holland on the part played by a species of *Pythium* in the reclamation disease of fodder beets and field peas (*Pisum arvense*), and by *Aphanomyces* sp. in the reclamation disease of oats [*R.A.M.*, x, p. 487], are here recapitulated in a condensed form.

SALMON (E. S.) & WARE (W. M.). **An unusual form of Hop canker.** —*Journ. South-Eastern Agric. Coll., Wye, Kent*, xxviii, pp. 62–64, 1 fig., 1 diag., 1931.

An account is given of an unusual form of hop canker (associated with a species of *Fusarium* having apparently a *Gibberella* as its perfect stage) [*R.A.M.*, ii, p. 132; iv, p. 264; ix, p. 339] which was reported from near Canterbury in 1924. The cankers, bearing *Fusarium* pustules, were usually about 2 in. above the soil, and not, as is usual, at the junction of the bine and crown. The attack had started in one corner of the garden (which consisted of the Fuggles variety) and had spread inwards probably from a large stack of strap cuts which bore *Fusarium* and *Gibberella* on their surface.

Further cases were found in a garden near Faversham in 1930 on six-year-old Fuggles hops which had suddenly wilted just before the hops were ready to be picked. The hills had been earthed up and the canker though sometimes entirely above ground was commonly just below the level of the soil and extending upwards to as much as a foot above the crown. *Fusarium* was present in abundance. These bine cankers are thought to have been favoured by the moisture induced by continuous rain in the earth heaped up around the hills.

SHEPHERD (E. F. S.). **Diseases of Sugar Cane in Mauritius.**— *Mauritius Dept. of Agric. Bull.* 41, Gen. Ser., 27 pp., 15 figs., 1931.

In continuation of his previous bulletin on the subject [*R.A.M.*, v, p. 695], the author gives full notes in popular terms, illustrated by numerous figures, on the symptoms and control of the following diseases of sugar-cane in Mauritius: red rot (*Colletotrichum falcatum*), smut (*Ustilago scitaminea*), gummosis (*Bacterium vascularum*), leaf scald (*Bact. albilineans*), root disease, pineapple disease (*Ceratostomella paradoxa*), top rot, the leaf spots caused by *Leptosphaeria sacchari*, *Helminthosporium ocellum*, and *Cercospora longipes*, streak, and stem deterioration. Most of the information given has already been noticed from other sources [ibid., ix, pp. 340, 507; x, p. 503, *et passim*]. A bibliography of 38 titles is appended.

Cook (M. T.). **Enfermedades de la Caña de Azucar en Puerto Rico.** [Diseases of Sugar-Cane in Porto Rico.]—*Puerto Rico Dept. Agric. y Com., Estac. Exper. Insul. Circ.* 94, 45 pp., 17 figs., 1931.

In this paper (translated into Spanish by F. Chardon) the writer gives popular notes on a number of well-known sugar-cane diseases occurring in Porto Rico [*R.A.M.*, ix, p. 808], much of the information on which has already been noticed from other sources. A key for the identification of the diseases is appended.

Fawcett (G. L.). **Las plantaciones de Caña sin mosaico en Tucumán.** [Cane plantations without mosaic in Tucumán.]—*Rev. Indust. y Agric. de Tucumán*, xxi, 7–8, pp. 126–127, 1931.

Notwithstanding stringent precautions in the matter of roguing and isolation, it has so far been found almost impossible to establish mosaic-free sugar-cane plots in Tucumán, Argentina [*R.A.M.*, viii, p. 636]. One plantation of P.O.J. 213 cane at the Experiment Station has remained healthy, possibly because it is overshadowed by avocado (*Persea gratissima*) trees and therefore avoided by aphids. Under such conditions, however, the canes naturally do not attain their full development, so that the establishment of plantings in similar sites holds little prospect of practical utility.

Bouriquet (G.). **Un pourridié de la Canne à sucre causé par Dictyophora multicolor Berk et Br.** [A root rot of Sugar-Cane caused by *Dictyophora multicolor* Berk. et Br.]—*Rev. Path. Vég. et Ent. Agric.*, xviii, 6, pp. 220–224, 1 pl., 1931.

The fructifications of *Dictyophora multicolor*, a member of the Phallaceae, were found in contact with the collar of stunted and rachitic sugar-canes growing in excessively wet soil in localities on the east coast of Madagascar. That the fungus was parasitic was indicated not only by the unhealthy condition of the canes and their roots, but also by the fact that mycelial strands from the carpophores were found to be adhering to the roots, within which was a fine mycelium resembling these strands. Louvier canes were the most susceptible, while the Port Mackay and Batavia varieties showed a satisfactory degree of resistance.

Control methods should consist in improved cultural methods and the use of resistant varieties.

Hiratsuka (N.). **Bibliography of Uredinales in Japan (1858–1930).**—*Fungi* (*Nippon Fungological Soc.*), i, 1, pp. 2–13, 1931.

This paper contains 162 bibliographical references to the literature of the Uredinales of Japan, covering the period from 1858 to 1912, inclusive.

Jackson (H. S.). **The rusts of South America based on the Holway collections. IV.**—*Mycologia*, xxiii, 5, pp. 332–364, 6 figs., 1931.

In this, the fourth paper of this series [*R.A.M.*, x, p. 756], the author describes 67 rusts (including two new genera and 19 new species) occurring on representatives of several sections of the

Leguminosae, and on Geraniaceae, Oxalidaceae, Erythroxylaceae, Malpighiaceae, and Rutaceae.

SYDOW (H.) & PETRAK (F.). **Micromycetes philippinenses. Series secunda.** [Philippine Micromycetes. Second series.]—*Ann. Mycol.*, xxix, 3–4, pp. 145–279, 1931.

Continuing their critical and taxonomic study of Philippine fungi [*R.A.M.*, viii, p. 137], the authors enumerate over 250 species of which more than 90 are new, with nine new genera. Latin and German diagnoses are furnished and there are numerous annotations.

SIDERIS (C. P.). **Taxonomic studies in the family Pythiaceae. I. Nematosporangium.**—*Mycologia*, xxiii, 4, pp. 252–295, 12 figs., 1931.

In this paper, which is stated to be the first of a series of taxonomic studies on the members of the family Pythiaceae, the author discusses the reasons which led him to re-establish the genus *Nematosporangium* [*R.A.M.*, ix, p. 561; x, p. 740; see also x, p. 342]. This is followed by detailed morphological and cultural descriptions of the twelve species (including three varieties) established by him in this genus, some of which have already been mentioned in a previous communication [ibid., x, p. 555], and all of which, with the exception of *N. indigoferae*, received from McRae in India, are stated to be more or less aggressively parasitic on the hosts enumerated in that publication [*Pennisetum barbinodum*, included among the hosts in the previous paper, is referred to under the name *Panicum barbinode* [*P. molle*] in the present one]. These species are *N. arrhenomanes*, *N. spaniogamon* n. sp., *N. hyphalosticton* n. sp., *N. polyandron* n. sp., *N. thysanohyphalon* n. sp., *N. rhizophthoron* n. sp., *N. leucosticton* n. sp., *N. leiohyphon* n. sp., *N. epiphanosporon* n. sp., *N. aphanidermatum*, *N. butleri*, and *N. indigoferae*. With the exception of the two last-named species, all these organisms were isolated from pineapple root rots. A key for the identification of these species is given.

SOLHEIM (W. G.) & STEVENS (F. L.). **Cercospora studies. II. Some tropical Cercosporae.**—*Mycologia*, xxiii, 5, pp. 365–405, 12 figs., 1931.

In this paper [which is in continuation of Solheim's previous communication: *R.A.M.*, x, p. 59] brief accounts are given (together with taxonomic notes and critical observations) of some 50 species of *Cercospora*. This genus is now divided into 38 sections, one of which is transferred to the genus *Didymaria* Corda, and for the last one of which the new genus *Ragnhildiana* is created to include the forms intermediate between *Cercospora* and *Cladosporium*. A key to the different sections is appended. The following may be mentioned.

Cercospora raciborskii Sacc. and Syd. [ibid., i, p. 207] on leaves of tobacco was examined from Hawaiian material, and is considered to be distinct from, though very closely related to, *C. nicotianae* [ibid., x, pp. 561, 585]. *C. manihotis*, *C. cearae*, and *C. henningsii*

are thought from the brief descriptions to be probably the same as *C. cassavae* [ibid., v, p. 144], but three specimens formerly determined as *C. henningsii* and one as *C. cassavae* from Porto Rico were found to belong to the new genus *Ragnhildiana* and are included in the new species *R. manihotis*. A form causing long, fairly broad, yellow to tan spots on the leaves of *Hibiscus esculentus* in the Philippines is considered to be a new species and is named *C. malayensis*. *C. cruenta* (with which *C. dolichi* may perhaps be identical) was determined from leaves, stems, and pods of *Phaseolus* sp., *P. vulgaris*, *P. lunatus*, *P. mungo*, *Dolichos* sp., and *Vigna catjang*; and *C. canescens* from leaves of *Phaseolus* sp., *P. lunatus*, *P. vulgaris*, *V. catjang*, *V. glabra*, *Amaranthus* sp., *Ricinus communis*, and from dead stems of tomatoes and *Petunia parviflora*.

BERKELEY (G. H.), MADDEN (G. O.), & WILLISON (R. S.). **Verticillium wilts in Ontario.**—*Scient. Agric.*, xi, 11, pp. 739–759, 10 figs., 1931.

In this paper the authors discuss in detail the taxonomic position of the species of *Verticillium* implicated in hadromycosis, and give in full their reasons for not accepting Wollenweber's [*R.A.M.*, ix, p. 6] and Rudolph's [ibid., x, p. 757] views in this respect. They start by pointing out that in this section of the genus *Verticillium* there are two types of resting condition. One of these, characteristic of *V. albo-atrum*, consists of loose masses of dark, thick-walled hyphae with numerous transverse septa, but no longitudinal walls, the individual cells of which are torulose, or may be little differentiated from the rest of the mycelium. The other type is composed of dark, knot-like, thick-walled structures, the result of budding of a single hypha, and is typical of *V. dahliae*. In their opinion, Wollenweber's and Rudolph's interpretation of *V. albo-atrum* as a sclerotial fungus is not correct, and is based on the loose usage of the term 'sclerotia' in the original description by Reinke and Berthold of the above-described loose masses of hyphae, for which they prefer the designation 'resting mycelia' (Dauernmycelien) also used by the original authors. Neither can the formations of the second type be correctly designated as sclerotia, since they do not consist of a weft of intertwining hyphae and have no cortical tissue differentiated from the rest of the structure; the term 'pseudo-sclerotia' is suggested for them. The study during seven years of hundreds of isolations of forms of *Verticillium* from many different hosts in Ontario, and also of type cultures of *V. albo-atrum* and *V. dahliae* obtained from the Centraalbureau voor Schimmelcultures in Baarn, showed that these characters of the two groups are very constant, sometimes disappearing after prolonged culture on synthetic media but reappearing when transferred to sterilized potato plugs, and are sufficient by themselves to differentiate *V. dahliae* from *V. albo-atrum*. In no case was the formation of true sclerotia or microsclerotia observed in any of the cultures of either species maintained by the authors. Another feature distinguishing the two species is their difference in pathogenicity as indicated by cross-inoculation studies with thirty-seven strains on thirteen different hosts during six

years; besides other minor differences, it was shown that the members of the resting mycelium (*V. albo-atrum*) group are stronger parasites than those of the pseudo-sclerotial (*V. dahliae*) group.

TAI (F. L.). **Observations on the development of Myriangium bambusae Rick.**—*Sinensia* (*Contr. Metrop. Mus. Nat. Hist. Acad. Sinica*), i, 10, pp. 147–164, 22 figs., 1931.

An account is given of the writer's studies of the morphology and cultural characters of *Myriangium bambusae*, a common parasite of the cultivated bamboo (*Phyllostachys puberula*) [*P. nigra*] round Nanking, China. The asci, one of which occurs in each locule of the stroma, are double-walled, subglobose to oblong, stipitate, 35·70 to 49·35 by 34·00 to 44·65 μ, and contain eight yellowish, muriform, fusiform, slightly curved, 5- to 7-septate ascospores, 32·90 to 44·00 by 14·10 to 16·45 μ. The inner sheath expands after ten minutes' to one hour's immersion in water, elongating to three or five times its original diameter after the rupture of the outer wall. The protruding ascus, elliptical at first, ultimately assumes a cylindrical shape. The ascospores germinate (sometimes while still within the ascus) either by the production of sprout cells or by the formation of a germ-tube direct from each cell. The sprout cells may fall off and germinate by germ-tubes, from which secondary sprout cells may again be budded off laterally or apically.

Small pycnidia, 45·6 to 60·8 μ in diameter, with a beak averaging 18 μ in height, and containing rod-shaped pycnospores, were observed either on the upper surface of the stroma or on the remaining host tissue at the margin of the stroma, but were not proved to be part of the life-cycle of *M. bambusae*. One of the cultures isolated from the ascigerous stage formed elliptical to cylindrical conidia, 9·16 to 19·17 by 2·5 to 3·75 μ, which developed singly on the tips of conidiophores.

STEINMANN (A.). **Verslag van den Mycoloog over 1930.** [Report of the Mycologist for 1930.]—*Arch. voor Theecult. Nederl.-Indië, 1931*, 4, pp. 161–164, 1931.

Experiments are in progress in Java on the control of the red root fungus of tea [*Ganoderma pseudoferreum*: *R.A.M.*, x, p. 409] by the application to the soil of copper sulphate, hedit, sulphur, sodium chlorate, and other inexpensive chemical disinfectants. The results of tests (now concluded) on the Pengalengan plateau showed that the hydrogen-ion concentration of the soil can be reduced within six months from P_H 5·8 to about 3 by sulphur applications at the rate of 500 gm. per sq. m. of soil. White zinc paint was found to be a good protective covering for pruning wounds on tea bushes.

Cinchona grafts are liable to a stripe disease characterized by the presence of coloured hyphae in the wood but not in the bark, so placed that the fungus (believed to be a species of *Diplodia*) evidently enters through the grafting wound at the stem base and thence proceeds upwards.

HASKELL (R. J.), MCMURTREY (J. E.), & FANT (G. W.). **Results of the Tobacco survey, 1930.**—*Plant Disease Reporter, Supplement* 80, pp. 5–29, 1931. [Mimeographed.]

As an outcome of the Conference on Tobacco Diseases and Nutritional Problems held at Washington, D.C., from 10th to 12th December, 1929, arrangements were made by the Plant Disease Survey and the Division of Tobacco and Plant Nutrition of the Bureau of Plant Industry with State collaborators and plant pathologists for seed-bed and field surveys in the tobacco-growing sections. A full account, accompanied by tables, is given of this work, comprising notes on the incidence of the various diseases observed, seed treatment, weather conditions, spraying, crop rotation, and the like.

HENDERSON (R. G.) & WINGARD (S. A.). **Further studies on Tobacco ring spot in Virginia.**—*Journ. Agric. Res.*, xliii, 3, pp. 191–207, 7 pl., 1931.

After a brief discussion of the distribution and economic importance of the ring spot disease of tobacco, the authors give a summary account of laboratory and greenhouse experiments in Virginia [some of which have already been noticed: *R.A.M.*, x, p. 492] to determine some of the properties of the virus causing it. The virus is very sensitive to desiccation, since in no case could infection be obtained from dried tobacco leaves. Three minutes' exposure to a temperature of 70° C. entirely inactivated the virus, while ten minutes at 60° considerably reduced its virulence. Juice expressed from infected tobacco plants and stored at −18° C. retained its infective power unimpaired for over 22 months. The virus is readily precipitated and separated from expressed juice with alcohol or acetone, and is filterable through a Berkefeld filter of W grade if the infectious juice is first freed from solid matter. It is infectious at dilutions as high as 1 in 1,000, but only a trace of infection could be obtained with a 1 in 10,000 dilution. Under greenhouse conditions the virus was found to persist for more than a year in the sap of tobacco plants propagated by cuttings, although the ring spot symptoms may remain masked in the plants during the whole of this period. Typical symptoms developed on detached tobacco leaves and cuttings which were kept alive in the laboratory in moist chambers, and it was shown that tobacco leaves of intermediate age and size are more susceptible to ring spot infection than either the very young or the very old leaves. Artificial inoculation of certain varieties of potato with the virus resulted in local infection (mostly solid necrotic spots) on the leaves; and re-inoculations on tobacco produced typical ring spots, but later some of the symptoms described by Johnson [ibid., v, p. 119] also began to develop, the indications being that the 'healthy potato virus' was also present. In tomato plants infection was produced by grafting them on diseased tobacco plants.

The investigation also showed that Jimson weed (*Datura stramonium*) and melon (*Cucumis melo*) are natural hosts of the tobacco ring spot virus. The viruses naturally present in *Melilotus officinalis*, yellow ironweed (*Verbesina* [*Actinomeris*] *alternifolia*), squash (*Cucurbita pepo* var. *condensa*), and *Petunia violacea* pro-

duced lesions very like ring spot when transferred to tobacco, differing in the severity of the symptoms produced on the latter; it is suggested that they may possibly be attenuated forms of the tobacco ring spot virus. There was very little evidence that this virus is seed-borne in tobacco, but it was very readily transmitted through the seed from naturally infected *Petunia violacea* plants [ibid., x, p. 492].

Fenne (S. B.). **Field studies on the ring-spot disease of Burley Tobacco in Washington County, Virginia.**—*Phytopath.*, xxi, 9, pp. 891–899, 1931.

The steam sterilization of tobacco plant beds in Virginia failed to prevent the occurrence of ring spot [see preceding abstract] infection in fields planted from these beds. In 1927 the percentage of infection by this disease in ten counties in Virginia amounted to 2·5 per cent. In Washington County 3 per cent. ring spot infection was recorded in 1928 and 7·6 per cent. in 1929, with an average injury of 43 per cent. to the affected plants, mainly by reduction in size of the leaves. The total loss caused by ring spot in Washington County during 1929 is estimated at $27,384.

Negative results were obtained in all attempts to transmit the ring spot virus by means of tobacco flea-beetles (*Epitrix parvula*), cucumber flea-beetles (*E. cucumeris*), leafhoppers (*Empoasca fabae*), aphids (*Macrosiphum solanifolii*) [*M. gei*], tobacco worms (*Phlegethontius quinquemaculata*), and fireflies (*Photinus scintillans*). Still the method of spread suggests that there must be an insect vector [cf. ibid., x, p. 695]. Stick weed (*Verbesina* [*Actinomeris*] *alternifolia*) and sweet clover (*Melilotus alba*) were found naturally infected by ring spot. Infection was readily produced on tobacco with the expressed juice from these plants. Twenty-five other species of weeds were tested for ring spot with negative results.

Murwin (H. F.). **Dominion Experimental Station, Harrow, Ontario. Report of the Superintendent for the years 1928, 1929 and 1930.**—90 pp., 9 figs., 1931.

This report contains (pp. 46–47) a note in which the results of experiments in varietal resistance to black root rot of tobacco (*Thielavia basicola*) at Harrow, Ontario, are presented in tabular form [*R.A.M.*, vii, p. 348; x, p. 761]. It was found that the standard flue-cured varieties, Warne and Hickory Pryor, are more resistant to the disease than the non-resistant varieties of either Burley or dark tobacco. Most resistant of all, however, are the resistant Burley varieties, Stand-up and Broad-leaf Resistant and C.R.B., and the dark G.R. Nos. 11009, 11008, and 11001.

Wolf (F. A.). **Gray mold of Tobacco.**—*Journ. Agric. Res.*, xliii, 2, pp. 165–175, 5 figs., 1931.

A brief account is given of a seedling disease of tobacco in North Carolina, caused by a species of *Botrytis* which is tentatively referred to *B. cinerea*. The disease, which appears as a grey mould of the leaves, later passing on to the stems which are girdled and finally killed [cf. *R.A.M.*, x, p. 628], is stated to be very prevalent in tobacco seed-beds in wet seasons, as it is apparently correlated

with high atmospheric humidity; thus, in 1928 and 1929 it was observed in nearly all of approximately 250 seed-beds examined, in a few of which it was so abundant and so destructive that none of the plants could be transplanted, while in 1930, the spring of which was much drier, only two out of 257 seed-beds investigated showed its presence. It is thought probable that the same organism may be associated with 'stem rot' of tobacco in curing sheds in Connecticut, Virginia, and Kentucky.

It was noted that the disease was most destructive in seed-beds situated on low-lying, poorly drained, and poorly ventilated ground, and it is believed that much of the damage done by it may be prevented by a proper choice of a site for the tobacco seed-beds.

JOCHEMS (S. C. J.). **Spikkel in Deli-Tabak.** [Leaf spot of Deli Tobacco.]—*Meded. Deli Proefstat. te Medan-Sumatra*, Ser. 2, lxxii, 38 pp., 3 pl., 1931. [English summary.]

Leaf spot (frog-eye) of tobacco (*Cercospora nicotianae*), which was very prevalent in Sumatra during the early period of tobacco cultivation (until 1900), was practically absent from 1910 to 1929, but in 1930 it recurred in a severe form, especially in black alluvial soils, and again caused considerable damage in 1931 [*R.A.M.*, vi, p. 444; x, p. 561].

The spots formed by the fungus on both surfaces of the green leaves in the field are circular, white or light brown, 1 to 10 mm. in diameter, with a darker brown edge, ¼ to 1 mm. wide, and an ashen-grey centre, the last-named being a distinguishing feature of infection by *C. nicotianae*. In some cases incipient infections continued to develop after the leaves had been picked [ibid., ix, p. 141], causing damage in the curing barns. In this form the lesions on the upper side of the dried leaves range from a dirty bluish-green to nearly black; on the under side they are always pale bluish-grey. These spots are circular and measure 2 to 10 mm. in diameter; they are much less sharply delimited than those on the green leaves and also less brittle. The centre of the lesions is usually occupied by a paler blue spot, 1 to 2 mm. in diameter, and on thick, reddish leaves a yellowish-brown margin may be observed round the lesions. It was shown by experiments [details of which are given] that the spots on cured tobacco leaves, especially of superior quality, largely disappear or become paler during fermentation. Rapid drying was found to prevent the development of these lesions to some extent.

Considerable importance is attached to the control of this barn spot, since the disease not only detracts from the appearance of the wrapping material but also impairs the elasticity of the leaves.

HOPKINS (J. C.). **Southern Rhodesia: Alternaria leaf spot of Tobacco.**—*Internat. Bull. of Plant Protect.*, v, 9, p. 165, 1931.

During the past season a serious leaf spot of tobacco occurred in several districts of Southern Rhodesia. The chief symptom of the disease, of which there are only two previous local records, is the appearance of small, brown spots on the lower leaves when the plants are coming into flower. The spots are chestnut- or Vandyck-brown with light brown or white centres and closely resemble those of

frog-eye (*Cercospora nicotianae*) [see preceding abstract]. Zonations are sometimes present in the darker brown parts of the lesions, which may enlarge to a diameter of 2 cm. Dark spots on the stem and midrib and the rapid spread of the disease to the uppermost leaves and seed pods are characteristic of infection by the *Alternaria* responsible for the spotting, which has been referred to *A. tabacina* (Ell. & Ev.) Hori, but does not appear to be identical with *Mucrosporium tabacinum* Ell. & Ev. associated with white speck of tobacco. It is thought to be probably the same as the organism causing a similar leaf spot in Hungary, referred by Gulyás to *A. tabacina* [*R.A.M.*, x, p. 212]. The quality of the affected leaves appears to undergo considerable deterioration during the curing process. The Hickory Pryor variety suffers severely from this *Alternaria* leaf spot, to which Orinoco White Stem, Gold Leaf, Warne, and a Turkish variety are also susceptible. The disease is favoured by protracted heavy rain, followed by bright periods, inducing rapid growth of the plants.

JOHNSON (J.) & OGDEN (W. B.). **The relation of air conditions to Tobacco curing.**—*Wisconsin Agric. Exper. Stat. Res. Bull.* 110, 6 pl., 1 diag., 13 graphs, 1931.

'Pole rot', which is believed to be identical with the condition described by Sturgis as 'pole burn' in 1891 (*Connecticut Agric. Exper. Stat. Rept.*, p. 168), is stated to have been the cause of difficulties in curing tobacco for a hundred years or more. In the writers' experiments the typical symptoms of pole rot were induced by the exposure of the leaves to a temperature of 60° F. combined with a constant relative humidity of 95 to 98 per cent. for a few days at the critical stage of curing, i.e., when the leaf-web was turning from yellow to brown. In order to prevent the development of saprophytes on the leaves, these were exposed in an air-tight chamber, while still green, to ceresan dust applied by a small blower for 10 to 15 minutes. The treated leaves cured normally, with a fairly good colour and little or no decay, whereas the undusted ones were severely damaged by typical pole rot. It seemed evident, therefore, that the disease was due to certain organisms and not of a purely physiological nature.

Both in the curing shed and under experimental conditions the first symptoms of pole rot are the development of small, round spots appearing comparatively dark by reflected, but translucent by transmitted light. The predominant fungus in these lesions has been identified as *Alternaria tenuis* [*R.A.M.*, vii, p. 765], the optimum temperature for the development of which probably lies near 80°. Experimentally the writers produced pole rot at a temperature range of 60° to 95°, with an evaporating power of 8 c.c. or less per diem.

It would appear that the only reliable method of prevention of shed damage during protracted periods of damp weather is the reduction of excessive humidity by the provision of artificial heat, in the form, for instance, of a small, open charcoal fire such as is used on primed, shade-grown tobacco in the Connecticut Valley with satisfactory results. Much more complete tests are, however, considered to be essential to the ultimate solution of the problem.

JØRSTAD (I.). **Innberetning fra statsmykolog Ivar Jørstad om soppsykdommer på skogtraerne i årene 1926–1930.** [Report from the State Mycologist Ivar Jørstad on the fungous diseases of forest trees during the years 1926–1930.]—*Beretning om det Norske Skogwesen for 1930*, Skogdirektøren, Oslo, pp. 78–96, 1931.

Notes are given on the diseases of forest trees observed in Norway between 1926 and 1930 [cf. *R.A.M.*, vi, p. 201]. Owing to the ravages of blister rust (*Cronartium ribicola*), Weymouth pines [*Pinus strobus*] are gradually disappearing, and in some districts they are being eradicated in order to safeguard the neighbouring black currants.

P. sylvestris, *P. murrayana*, and Austrian pine [*P. laricio* [var.] *austriaca*] are liable to heavy damage from the cankers produced by *Dasyscypha subtilissima*, *D. resinaria*, and *D. fuscosanguinea*, the last-named being primarily a northern species [ibid., viii, pp. 424, 687, 744].

Brunchorstia pinea, the perfect stage of which has recently been referred by Jørgensen in Denmark to *Crumenula abietina* [ibid., x, p. 272], causes severe injury to Austrian pine, *P. montana*, and *P. cembra* in the western coastal and adjacent districts. *C. pinicola* sometimes accompanies *B. pinea*, but is more often found alone as a parasite on the young branches of *P. sylvestris* and other pines. In the spring of 1927 some half million *P. sylvestris* and *P. montana* nursery trees were destroyed by *Lophodermium pinastri*. *Phacidium infestans* [ibid., x, p. 1] is the cause of extremely severe injury to *P. sylvestris* and other pines in the higher altitudes, where the fungus develops under the snow cover. *Picea pungens* is highly susceptible to infection by *Rhizosphaera kalkhoffii* [ibid., viii, p. 275], which is widely distributed in spruce stands throughout the country, often causing considerable leaf fall.

D. calyciformis [ibid., viii, p. 424] has been observed on *Abies balsamea*, *A. cephalonica*, *A. concolor*, *A. fraseri*, *A. grandis*, *A. nobilis*, *A. nordmanniana*, *A. pectinata*, and *A. sibirica*, while *A. pinsapo* appears to be immune. *Rehmiellopsis abietis* [ibid., v, p. 197] attacks the current year's spruce shoots (especially *A. pectinata*) to which it gives a frost-bitten appearance; *A. sibirica* has also been found susceptible. *Pseudotsuga taxifolia* was infected by *D. resinaria* in 1927 and 1928. *Diaporthe aristata* is a common parasite of birch branches. *Venturia tremulae*, the conidial stage of which is *Fusicladium radiosum*, produces black spots on aspen leaves and often kills the current year's shoots; this fungus is liable to occur in epidemic form. *Marssonina populi* [ibid., ix, p. 568] is responsible for the brown discoloration and shedding of poplar (*Populus nigra*, *P. laurifolia*, and *P. alba*) leaves. Ash cankers due to *Nectria galligena* [ibid., xi, p. 12] are stated to be very prevalent in the coastal districts. *V. fraxini* has occasionally been observed to produce spots on ash leaves.

An examination by Dr. H. W. Wollenweber of elm material suspected of infection by *Graphium ulmi* showed that this fungus was not present; legislative measures to prevent its introduction were adopted in 1930 [ibid., ix, p. 816]. *Uncinula tulasnei* [ibid., x, p. 274] causes considerable damage to Norway maples [*Acer*

platanoides] in nurseries. The same host is extensively affected by the witches' brooms due to *Taphrina acerina*, which spreads so rapidly from branch to branch that the crown of an infected tree soon appears to consist solely of witches' brooms. *Polyporus connatus* causes a wood rot of *A. platanoides*, plane [*Platanus*], poplar, lime, and beech trees.

FINLAYSON (E. H.). **Report of the Director of Forestry 1929–30 (fiscal year ended March 31, 1930).**—*Dept. of the Interior, Canada*, Ottawa, F. A. Acland, 62 pp., 8 figs., 1931.

This report contains, *inter alia*, the following items of phytopathological interest. In the summer of 1928 an investigation was commenced on a nursery disease of poplars, apparently due to a *Septoria*. The shoots of a large number of poplar cuttings in the forest nursery station showed from one to five oval, black, depressed spots, up to 1 inch long and extending to half the circumference of the stem; many shoots showed yellow leaves that later shrivelled but remained attached to the stem. Inoculation experiments on healthy rooted cuttings with the fungus gave positive results.

Counts made in the summer of 1929 indicated that the average survival from clean cuttings is 82 per cent., compared with 33 per cent. when the cuttings showed blackened areas. The selection of clean cuttings and planting in clean soil appear to be sufficient to ensure control of the disease.

A species of *Cytospora* has been found responsible for an injurious perennial stem and branch canker of older poplars [*R.A.M.*, x, p. 418]. On inoculation the fungus appears harmless on healthy tissue, but in callus tissue surrounding wounds in the Russian poplar [? *Populus maximowiczii*] it becomes established, and by repeated annual injury with fresh callus production causes a very common and ultimately fatal lesion. A number of greenhouse inoculations were unsuccessful, indicating that the fungus is a weak parasite which can only penetrate the tissues through wounds. Cottonwood (*P. deltoides*) is occasionally attacked by the perennial canker but appears to be much less susceptible than the Russian poplar.

The question of brown or red heart in yellow birch [*Betula lutea*], the use of which for commercial purposes is stated to be increasing, has been investigated at the request of the Pulp and Paper Association. *Torula ligniperda* [ibid., ix, p. 215] was isolated from brown streaks in the heartwood, and when reinoculated into birch culture-blocks it produced a conspicuous discoloration in the wood.

VOGLINO (P.). **Il 'secume' del Pioppo.** [Die-back of Poplar.]—*La Difesa delle Piante*, viii, 3, pp. 1–3, 1931.

In recent years the die-back due to *Didymosphaeria populina* [the symptoms and mode of transmission of which are briefly described] has become increasingly prevalent on *Populus canadensis* Moench in Piedmont. In 1926 Ferraris stated that the disease was common in various parts of France on *P. nigra* var. *italica* [the Lombardy poplar] though other poplars appeared to

be unaffected; however, as early as 1905 the author had already observed the leaf form of the disease on other species.

In May, 1930, diseased branches of *P. canadensis* were received from all parts of Piedmont where excessive rain and sudden changes of temperature appeared to have provoked a rather violent epidemic of the disease. As the trees were affected while in an early stage of vegetation the only effect of the condition was a temporary arrest of growth.

P. canadensis appears to be highly susceptible, whereas the Carolina poplar (*P. canadensis* var. *carolensis* Foug.) is almost completely resistant, as is a cross between the former and *P. nigra*.

In spite of the severity of the outbreak in 1930, the disease is not considered to constitute a serious danger at present, attacks depending upon an exceptionally wet spring. In 1931, when the spring was normal, no attack of *D. populina* was reported from the localities previously affected.

KÄMPFER (M.). **Neue Seuche an Pappeln.** [A new Poplar epidemic.]—*Gartenwelt*, xxxv, 38, p. 525, 1 fig., 1931.

Some 90 per cent. of the five- to eight-year-old poplar (*Populus simonii*) trees in the Köpenick district of Berlin were severely attacked in the summer of 1931 by *Dothichiza populea* [*R.A.M.*, x, p. 417]. The fungus spreads up and down the trunk from the primary centres of infection in the branch rings, forming discoloured, scabby, moist lesions almost the size of a hand. Sinuous, depressed areas develop as a result of the disorganization of the tissues by the fungus, and in advanced stages of the disease the leaves wilt and die. Presumably the trees in question were weakened by their transplantation during the last three years. *D. populea* has recently been reported with some frequency from Westphalia, into which province it was probably introduced from France on *P. robusta*.

BUISMAN (CHRISTINE). **Übersicht über die Ulmenarten in Bezug auf den Kampf gegen die Ulmenkrankheit.** [Survey of Elm species in connexion with the campaign against the Elm disease.]—*Angew. Bot.*, xiii, 5, pp. 459–464, 1931.

Reference to the writer's notes on the distribution of the different species and varieties of *Ulmus* in America, Asia, and Europe, in connexion with the control of the elm disease (*Graphium ulmi*) by the use of immune or resistant sorts, has already been made from another source [*R.A.M.*, x, p. 696].

FRANSEN (J. J.). **De verbreiding der Iepenziekte door de Iepenspintkevers en de bestrijding van dit insect in de practijk.** [The spread of the Elm disease by Elm sap beetles and the control of this insect in practice.]—*Tijdschr. over Plantenziekten*, xxxvii, 9, pp. 169–183, 3 pl., 1931.

In the course of further investigations [full particulars of which are given] on the direct and indirect control of the elm sap beetles (*Scolytus scolytus* and *S. multistriatus*), which are implicated in the dissemination of *Graphium ulmi* in Holland [*R.A.M.*, x,

p. 565], the writer obtained good results with the following repellents: coal-tar, 100 per cent. carbokrimp (Utrechtsche Asphalt Fabriek) [ibid., v, p. 560], asphalt, 100 per cent. wood carbolineum, and wood carbolineum + paradichlor-benzol. This paper is followed by a discussion (pp. 184–187).

Insect pests and fungus diseases of basket Willows.—*Min. of Agric. & Fish. Bull.* 29, 14 pp., 4 pl., 1931.

Semi-popular notes are given on the following fungous diseases of basket willows (*Salix* spp.): black canker (*Physalospora miyabeana*) [*R.A.M.*, x, p. 139]; rust (*Melampsora* spp.), the cankers caused by which are most frequent on varieties of *S. triandra*, such as Champion and Black Maul; scab (*Fusicladium saliciperdum*) [ibid., ix, p. 500], the occurrence of which in south-west England appears to be secondary to that of black canker; anthracnose (*Marssonina salicicola*) on *S. purpurea* (Red Welsh variety) [ibid., ix, p. 814]; and *Cryptomyces maximus*, reported from Scotland [ibid., vi, p. 65] as causing the development of elongated black cushions on the bark of willow rods and giving them a scorched aspect.

Goodding (L. N.). **Didymosphaeria oregonensis, a new canker organism on Alder.**—*Phytopath.*, xxi, 9, pp. 913–918, 2 figs., 1931.

Three species of alder, viz., *Alnus rubra*, *A. tenuifolia*, and *A. sinuata* in the Pacific Northwest are stated to be severely parasitized by a new canker-producing fungus, *Didymosphaeria oregonensis* [*R.A.M.*, x, p. 216]. The cankers, varying from half an inch to 2 ft. or more in length, extend round the young limbs and trunks; they cease to grow when the bark thickens and hardens but scars are often left on the trunks of mature trees. The fungus produces marked zonation on the tender bark so that the age of simple cankers may readily be estimated. A longitudinal section of a canker where swelling has occurred shows increased thickness of the annual layers following infection, apparently due to the release of tension where the outer bark is ruptured when the perithecia reach maturity. Finally, the outer layer of the bark exfoliates, leaving a roughened, ragged surface to which the perithecia usually remain attached, though they may peel off with the outer cork layer.

The perithecia of *D. oregonensis* are globose, dark brown, or black, measuring about 1 mm. across and opening by a very minute pore; the cavity is completely filled with branched, septate paraphyses and cylindrical to clavate or irregular asci, 75 to 90 μ long, containing eight 'kildare green' (Ridgway), uniseptate ascospores, rounded at both ends, measuring 18 to 21 by 7 to 9 μ.

D. oregonensis appears to be related to *D. wallrothii* (Hipp.) Sacc. & Trott. on birch bark (not reported from North America), but it differs from this species in its larger spores, less conspicuous perithecia, and non-protruding ostioles. It may also be allied to *D. nana* var. *brachyspora* Sacc., occurring on alder leaves, but the spores of *D. oregonensis* are relatively broader, and moreover the latter has not been reported on the foliage.

KORSTIAN (C. F.) & BRUSH (W. D.). **Southern White Cedar.**—*U.S. Dept. of Agric. Tech. Bull.* 251, 75 pp., 15 figs., 3 graphs, 1 map, 1931.

This bulletin contains (pp. 13–15) notes on white cedar (*Chamaecyparis thyoides*) diseases in the Atlantic and Gulf coastal swamps and estuaries of Virginia, North Carolina, New Jersey, Alabama, and Florida. *Keithia* [*Didymascella*] *chamaecyparissi* [*R.A.M.*, vii, p. 59] is a vigorous parasite that causes severe damage to the foliage of young trees and seedlings, eventually killing the twigs. The perithecia of the fungus are usually conspicuously reniform; they occur on the upper side of the leaf and rupture unilaterally. The effects produced by *Lophodermium juniperinum* are similar but less destructive. This organism has small, black fruiting bodies which rupture irregularly, and are found chiefly on foliage in very moist conditions. *Asterina cypressina* attacks and kills the leaves of older twigs.

Gymnosporangium myricatum, the alternate stage of which occurs on *Crataegus*, produces warty swellings on the branches and trunks, often accompanied by a broom-like development of twigs. *G. botryapites* causes similar but more fusiform and ridged swellings.

Trametes subrosea [*T. carnea*: ibid., ix, p. 80] is much the most important fungus hitherto found destroying the heartwood of *C. thyoides*. In dense stands there is some evidence of transmission from one tree to another through the roots. The heartwood of the trunk is rarely rotted beyond the first log length, the rot being often confined to definite pockets. In the roots the decay is more uniform. In the early stages it is light reddish-brown, later becoming darker and breaking up into quasi-rectangular blocks that crumble under pressure. The earliest observed infection of southern white cedar by *T. carnea* occurred at the age of 40 to 50 years.

An unidentified laminated, spongy butt rot resembles that caused by *Poria weirii* [ibid., vi, pp. 386, 450] on western red cedar [*Thuja plicata*] and may be due to the same fungus. *Polyporus schweinitzii* has occasionally been observed causing a butt and root rot which is darker, more markedly cubical, more friable, and more evenly distributed through the heartwood than that produced by *T. carnea*. Both *Fomes annosus* and *Armillaria mellea* are parasitic on the roots of *C. thyoides* and cause a white rot of the heartwood, but only one case of each has been studied and the extent of the damage is unknown.

DAY (W. R.). **The relationship between frost damage and Larch canker.**—*Forestry*, v, 1, pp. 41–56, 2 pl., 1 fig., 1 graph, 1931.

The author states that on the ground of his field observations and histological studies [considerable details of which are given] of the cankers of European larch [*Larix europaea*] collected in Bagley Wood near Oxford, he considers that spring and autumn frosts are a definite and often serious cause of canker in this tree. The investigation showed that in young stems, not yet protected by a thick, rough bark, the cambium is susceptible to frost injury from about the middle of March to the beginning of October,

a time which, as indicated by the examination of weather records at Oxford from 1892 to 1929, includes periods during which severe early and late frosts are of common occurrence. In the spring the cambium first becomes active over strictly localized areas, e.g., around a dwarf shoot or at the base of a twig, and it was shown that it is in such areas that canker formation is most liable to occur. The cambium continues to resume activity in the spring in the region of the canker earlier than elsewhere, and apparently also becomes dormant later in the autumn, thus being more liable to frost injury than in other parts of the tree. Although in all the cankers studied, the larch canker fungus (*Dasyscypha calycina*) [*R.A.M.*, viii, p. 745; ix, p. 501] was present in the dead tissues, there was no evidence of its behaving as a parasite, since the primary diagnostic feature of the cankers was the presence in the wood of definite frost rings, free from fungal mycelium, the nature of the abnormal tissues in which pointed to the lesion being of traumatic origin.

It was finally shown that susceptibility to frost injury is not the same for all individual trees, and that it is to a great extent dependent on the locality.

LIESE (J.). **Zur Rhabdoclinekrankheit der Douglasie.** [On the *Rhabdocline* disease of the Douglas Fir.]—*Forstarch.*, vii, 18, pp. 341–346, 4 figs., 1931.

Particulars are given of the author's investigation of the leaf fall disease of Douglas firs (*Pseudotsuga taxifolia*) caused by *Rhabdocline pseudotsugae* near Wittenberg [*R.A.M.*, x, p. 634 and next abstract]. In one area about 1·2 acres in extent the 16-year-old trees had evidently been infected since 1927. The typical symptoms of the disease [which are briefly indicated] were observed chiefly on the blue and grey varieties (vars. *glauca* and *caesia*), but a certain number of the green type (var. *viridis*) were also affected. *Polyporus* [*Fomes*] *annosus* and the honey fungus [*Armillaria mellea*] occurred on the roots of some of the diseased trees, but no correlation could be found between the occurrence of these fungi and that of *R. pseudotsugae*. The second Douglas fir stand of 6·8 acres presented a similar picture to the foregoing, except that the first severe attack on a number of the 15-year-old trees apparently took place in 1930. The damage caused by *R. pseudotsugae* in these stands is stated to be very considerable. Most of the affected trees have lost all the needles of the last three years' shoots, involving a heavy loss of brushwood.

The trees were originally procured as one-year-old seedlings from J. Hein's Söhne, Halstenbek, and the healthy condition of the older needles shows that the fungus was not present at the time of delivery. Since no further consignments of Douglas firs have been imported, the spores of *R. pseudotsugae* must have been conveyed to the Wittenberg district from some other centre of infection, e.g., Gadow (35 km. from the diseased stands), the Dutch frontier, or the former Grand Duchy of Lauenburg.

During the winter of 1931–2 all infected branches must be burnt. The view has been expressed that the leaf fall epidemic should be allowed to continue unchecked in order to eliminate all susceptible

individuals, but this course is opposed by the writer on technical and economic grounds.

PLETTENBERG V. **Rhabdocline pseudotsugae.**—*Forstwissensch. Centralbl.*, liii, 21, p. 772, 1931.

According to an official statement issued by the local committee for silvicultural seed certification of the Chamber of Agriculture for the Brandenburg and Berlin Province, Douglas firs [*Pseudotsuga taxifolia*] are infected by *Rhabdocline pseudotsugae* in two districts of the Mark Brandenburg, one of Hanover, and one of Holstein [see preceding abstract]. It is recommended by the forestry plant protection headquarters (College of Forestry, Eberswalde) that all diseased trees should be felled during the coming autumn and winter and the lopped wood burnt before the spring.

SNELL (W. H.). **The Kelm Mountain blister-rust infestation.**—*Phytopath.*, xxi, 9, pp. 919–921, 1931.

During the past eight summers 96·5 per cent. of the white pine [*Pinus strobus*] trees on the two-acre Kelm Mountain observation plot in Warren County, New York, brought under regular observation by the writer in 1923, have been found to show infection by blister rust (*Cronartium ribicola*) [*R.A.M.*, x, p. 353]. At the time of writing 90·6 per cent. of the stand, most of which is from 17 to 21 years old, showed living cankers, of which 9,000 have been found in all, an average of about 9 per tree. One tree bore 298 cankers and 7 had between 100 and 200. In 1920 there was not a dead tree on the lot; in 1923, 9 per cent. were dead, in 1924, 14 per cent., in 1926, 30 per cent., in 1927, 42 per cent., in 1929, 60 per cent., and in 1930, 69 per cent. There still remain on the plot 18 per cent. of the entire number expected to die in a few years, making an imminent mortality of 87 per cent. of the stand. The original stand, undisturbed by disease, would probably have produced between 60,000 and 70,000 board feet of high-grade lumber. The rust will have left only 147 healthy trees, of which 40 will be removed by shading, and the value of the survivors will be negligible. The 147 trees which withstood the severe attacks of blister rust between 1910 and 1920 and are still intact appear to be genuinely immune from *C. ribicola*, and tests on the reaction of their progeny to the rust would be of great interest.

KOCH (E.). **Can the cost of blister rust control be justified?**—*Journ. of Forestry*, xxix, 5, pp. 721–723, 1931.

Some statistics are given in support of the ten-year plan of *Ribes* eradication for the control of white pine blister rust [*Cronartium ribicola*: see preceding abstract] in the national forests of Idaho and western Montana, to which the Forest Service is definitely committed. The scheme provides for the treatment of 293,000 acres at an estimated cost of $3,377,000; the appropriations for 1930 amount to $195,000, a sum that will permit of large-scale operations. The prospects for the protection of 1,200,000 acres of private land in the same region are less encouraging, and it is suggested that large areas may have to be

acquired by the State before the necessary control measures can be applied.

BENEDICT (W. V.) & HARRIS (T. H.). **Experimental Ribes eradication Stanislaus National Forest.**—*Journ. of Forestry*, xxix, 5, pp. 709–720, 2 graphs, 1931.

Experimental work in the Stanislaus National Forest, California, was carried out in 1926, 1927, and 1930 in connexion with Federal plans for *Ribes* eradication in order to prevent the infection of sugar pine [*Pinus lambertiana*] by blister rust [*Cronartium ribicola*: *R.A.M.*, x, p. 698 and preceding abstracts]. A satisfactory degree of efficiency has been achieved, resulting in the elimination of 89 to 95 per cent. of the original bushes. The cost of the operations is stated to be lowest on unlogged areas and highest beside streams.

OGILVIE (L.) & MULLIGAN (B. O.). **Progress report on vegetable diseases.**—*Ann. Rept. Agric. & Hortic. Res. Stat., Long Ashton, Bristol, for 1930*, pp. 127–146, [1931].

In further tests of the pathogenicity of *Fusarium martii* var. *phaseoli* on dwarf beans [*Phaseolus vulgaris*: *R.A.M.*, ix, p. 700], surface-sterilized seeds were sown in sterilized soil and watered with a suspension of the spores or soaked in a watery suspension of cultures before sowing. All the plants so infected developed large red stem lesions, from which the fungus was reisolated. The following varieties were somewhat resistant: Flageolet Victoria (Magnum Bonum), Saxony, Incomparable, Flageolet St. Andrew, and Dwarf Sharpe's Goliath.

A bacterial disease of dwarf beans is becoming increasingly important in the Evesham area, where it is known as 'rust'. The most striking symptom is a sudden wilting of the whole or part of the plant, the leaves turning brown but remaining on the plant. The wilting is due to a bacterial invasion of the vascular system. Definite, small, angular, water soaked areas surrounded by a light coloured halo occur on the leaves, or an abundance of small infections may give the leaf a scorched appearance, while characteristic, green, water soaked, later reddish lesions are found on the stem, and give out a milky-white bacterial ooze. The pods show water soaked lesions, and if infected at an early stage they become curled and twisted, and reddish-brown streaks may develop. Seeds from infected pods bear very wrinkled, maize-yellow spots on the seed-coat; under these lesions numerous bacteria are present. Tentatively, the disease has been identified as halo blight (*Bacterium medicaginis* var. *phaseolicola*) [ibid., x, p. 434]. Infected seed is the common mode of dissemination of the disease.

An investigation of diseases of broad beans [*Vicia faba*] showed that several appeared to have been confused with the chocolate spot attributed to *Bacillus lathyri* [ibid., vii, p. 214; see also viii, p. 629]. *Ascochyta fabae* was present in most of the fields, and this as well as other leaf spots was frequently followed by *Botrytis cinerea*, which often killed off the tips of the shoots.

A bacterial spot and marginal scorch of lettuces, probably identical with that caused by *Bact. marginale* [ibid., ix, p. 224],

is common in the Bristol area. A yellow organism closely resembling *Bact. vitians* [loc. cit.] was isolated from a stem rot of lettuce.

The foot rot of peas previously reported as associated with a *Fusarium* [ibid., ix, p. 700] was again very prevalent in the Evesham area. The affected plants show dark brown to purplish streaks on the lower part of the stem, especially near its junction with the roots. The stem is somewhat constricted over the affected area and easily broken at or below soil level. The disease tends to spread downwards into the roots, which develop characteristic streaking and may finally rot off. A *Fusarium* [the cultural characters of which are indicated] was constantly isolated from the diseased plants and found to agree with *F. martii* var. *pisi* [ibid., viii, p. 214]. Notes on the reaction of a number of varieties to this disease are given.

Potato sickness [ibid., x, p. 546], associated with infestation by the eelworm *Heterodera schachtii* and with *Corticium solani* as well as, frequently, *Colletotrichum atramentarium*, has become a serious trouble on allotments near Bristol. The authors consider that the part played in the causation of the disease by *C. atramentarium* should be more fully investigated.

Vegetable marrow mosaic was first observed in the Bristol province in 1928. The symptoms consist in a very marked leaf mottling which takes the form of pale yellow markings tending to run in wavy lines or circles; the leaves also become rather puckered. Affected shoots have shortened internodes and tend to branch, while the affected fruits are mottled and covered with circular wart-like areas. All the young leaves and shoots of an affected plant ultimately show the symptoms, but the older leaves remain apparently normal. Much of the young fruit dies off without developing. The disease appears to be transmitted through the seed. It is rapidly increasing in prevalence.

United States Department of Agriculture Plant Quarantine and Control Administration. Service and Regulatory Announcements, April–June, 1931.—88 pp., 1931.

The present series of announcements contains, *inter alia*, a summary of the plant quarantine regulations of Peru, the Central American countries, and Mexico.

Morocco (French zone).—*Internat. Bull. of Plant Protect.*, v, 9, p. 167, 1931.

A Vizirial Decree of 10th June, 1931, provides that dealers in insecticides and fungicides, whether raw material or compounds, must supply the precise name and composition of the products placed on sale, indicating the useful components and their percentage proportion, together with all other indications necessary for identifications.